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hp·ux / usr

September/October 1997

**Look Out ISDN,
Here Comes ADSL**

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Don't kill -9

28

NFS on NT

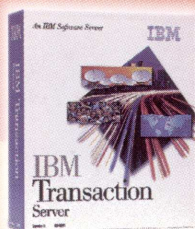
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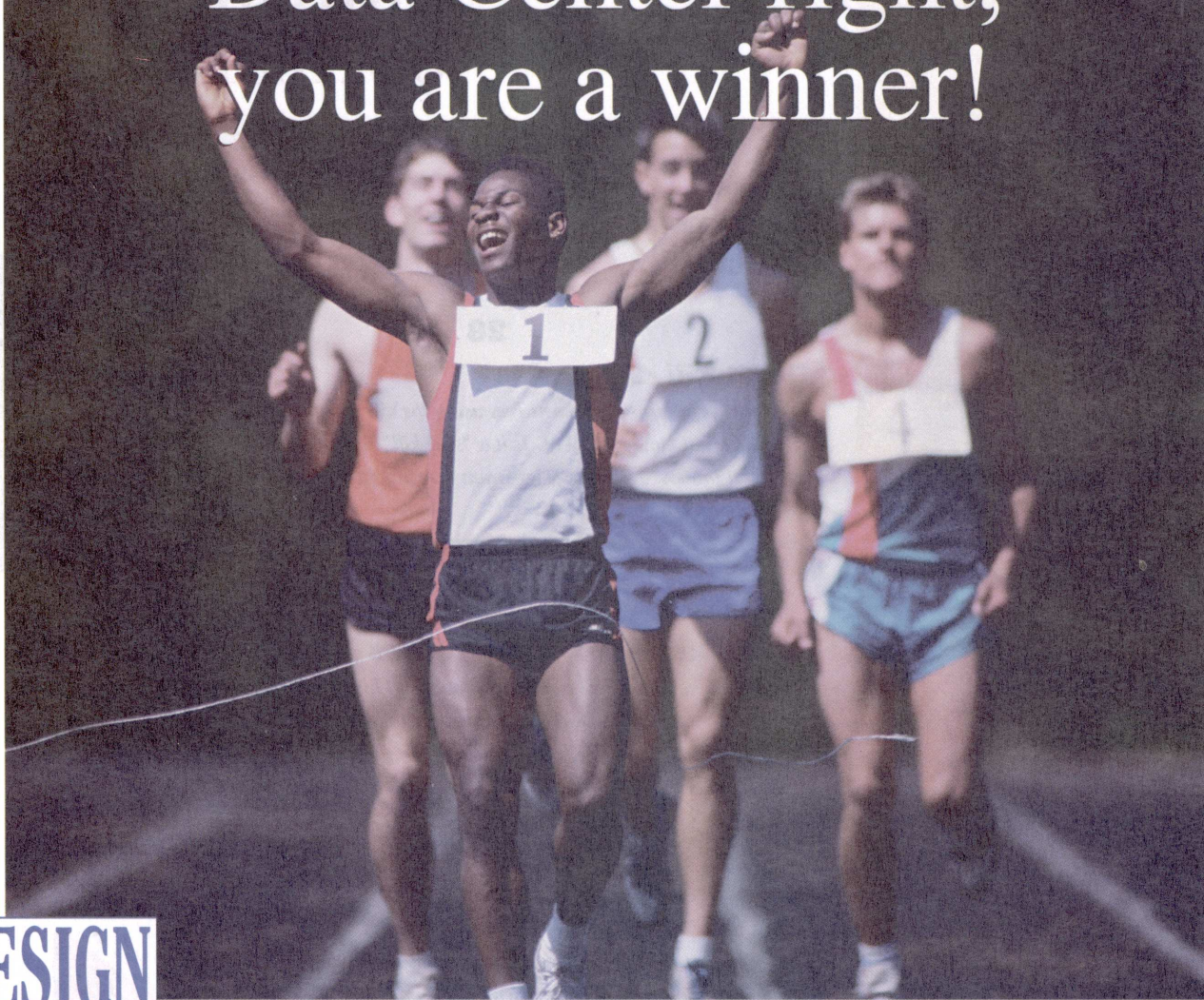
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Don't kill -9!

Most sys admins find themselves using the kill command every day and most use kill -9. Is it a "sure kill"? Not. kill does not kill a process. This article gives you the straight dope on the kill command.

Yitshak Merin

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Look Out ISDN, Here Comes ADSL

Another acronym and another technology. This article covers the basics of Asymmetric Digital Subscriber Line technology and current projected service availability and pricing.

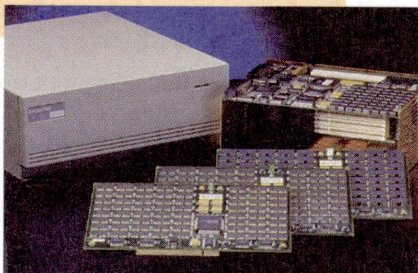
Kevin B. Wong

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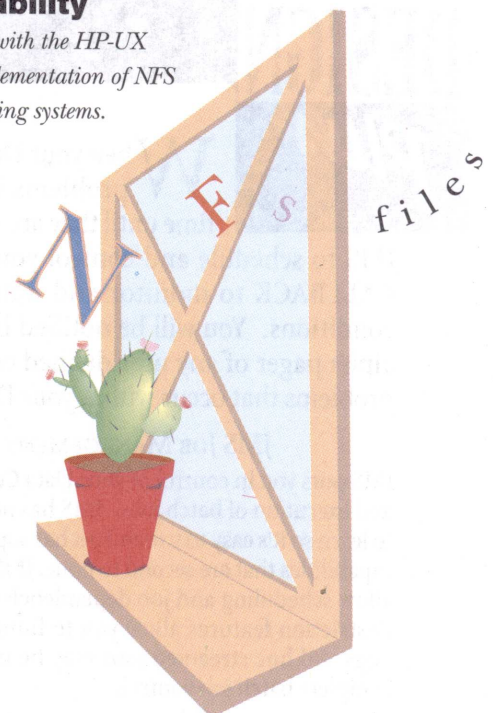
Network File System as Part of HP-UX and Windows NT Interoperability

NFS is a widely used technology that comes with the HP-UX operating system. This article discusses the implementation of NFS on NT, bridging the gap between the two operating systems.

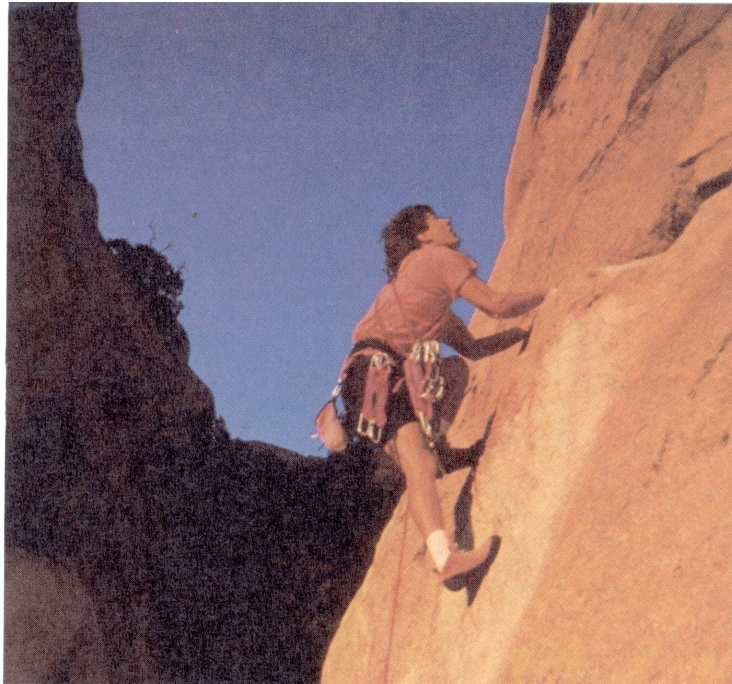
Marty Poniatowski



New Products 8



Cover Illustration by Joe Saxe



Tough to scale

Protect your investment in tape backup equipment with the LibraryXpress system. Begin with a base module containing one or two DLT4000 or DLT7000 drives and 10 cartridges. This will provide you with a storage capacity of up to 700 gigabytes and a data rate of 72 gigabytes per hour.



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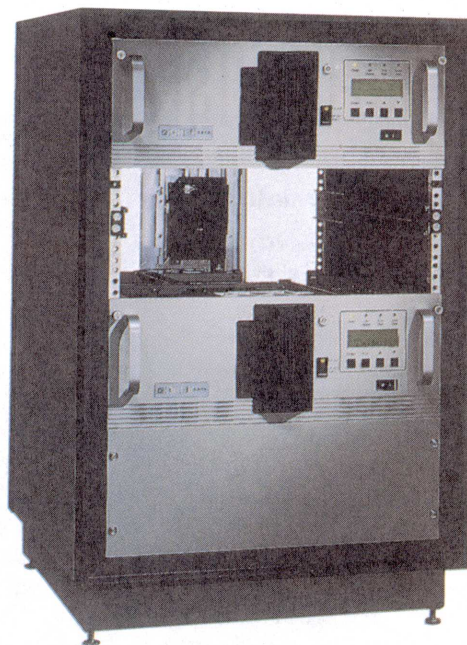
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Stuck using tar?

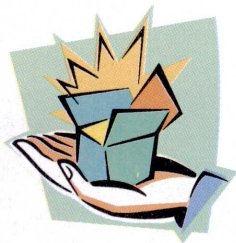
(or fbackup, cpio, or dump?)

What a sticky mess! Standard UNIX backup utilities force you to glue on scripts to make them work right, have performance like molasses, user interfaces that are clear as pitch, and reliability that could drag your career down into a pit. It's time to kick asphalt. Load BACKUP/9000 (it takes less than 10 minutes), and automate super fast, reliable backups and restores on any networked system via its slick user interface. Let BACKUP/9000 back up your Oracle databases hot, track tapes and files, manage media, schedule backups, etc. Don't get stuck - get something faster, easier, and more reliable. Contact us for a free demo today, before things get really messy.



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New Products

Java-Based Test and Measurement

Real Time Integration, Inc. has announced the NetAcquire Java Toolkit, which allows Java applets to acquire, process, and update real-time analog and digital data over an Ethernet network. Java applets use the NetAcquire Java Toolkit and a TCP/IP network to communicate with NetAcquire server hardware containing analog-to-digital conversion hardware.

Both stand-alone Java applications and browser-enabled Java applets can connect to NetAcquire hardware to obtain a real-world interface to analog and digital data. The toolkit's Java classes provide stream-based communications with one or more NetAcquire servers. Complete distributed NetAcquire applications can be created with fewer than 50 lines of Java code.

The NetAcquire Java Toolkit supports Netscape 3.0, Internet Explorer 3.0, and Sun Microsystems JDK 1.0.2 and is priced at \$495. NetAcquire data acquisition and control hardware is priced at \$5,495.

Contact Real Time Integration, Inc., phone: (888) 675-1122 or (425) 462-5817, e-mail: info@realtimeint.com, <http://www.realtimeint.com>.

Event Management

Grapevine Systems, Inc. has announced ENGWARD 2.0. ENGWARD's configurable server platform can monitor HP/UX, Windows NT, IBM AIX, Stratus VOS/FTX, Sun Solaris, SCO UNIX, and Tandem Guardian systems at the hardware/operating system, communication, and application levels. Release 2.0 provides remote accessibility via the Internet.

ENGWARD is Year 2000 compliant and provides a turnkey system for increasing the availability of mission-crit-

ical applications. ENGWARD allows personnel to be notified of predefined events before they escalate into business interruptions. The combination of ENGWARD's intuitive alert definition, comprehensive alert notification, and flexible remote access is designed to increase the availability of any system.

Contact Grapevine Systems, phone: (800) 755-1596 or (402) 333-3322, <http://www.grapevinesystems.com>.

Internet-Based Business Applications

BASIS International Ltd., has announced BB-Web, a software toolset for adding Web access to Business Basic applications. The new software is written in BBX, BASIS' highly extended version of the Business Basic language. Developed by Synergetic Data Systems Inc. (SDSI), BB-Web enables software developers to produce Web-based applications or Web-enable existing applications in Business Basic, rather than in scripting languages such as C or Perl.

The new merging facility combines BBX data with HTML templates and provides routines for reading BBX files and generating HTML-format lists from them. BB-Web thus speeds Web interface development without interfering with the commercial application code.

BB-Web works on both Windows and UNIX platforms and is priced at \$995.

Contact Basis, phone: (505) 345-5232, fax: (505) 345-5082, e-mail: info@basis.com, <http://www.basis.com>.

New from BGS Systems

BEST/1-Visualizer Release 3.2

BGS Systems, Inc. has announced Release 3.2 of BEST/1-Visualizer, which features Web publishing and ODBC sup-

port. The Web Publishing option converts the graphs, graph page projects, and graph notes to JPEG-based HTML files and invokes Microsoft's Web Publishing Wizard. The user then can move the converted files to the Web server.

With Release 3.2, an ODBC-compliant database can be used in place of the integrated Paradox database, which makes possible the implementation of a distributed BEST/1-Visualizer database on a different platform supported by the user-chosen, ODBC-compliant database. Release 3.2 also includes conversion routines to convert existing BEST/1-Visualizer Paradox databases to an ODBC-compliant RDBMS.

BEST/1-Visualizer Release 3.2 can now report on SNA networks and Tandem systems.

BEST/1 for TME 10

BGS Systems, Inc. has announced BEST/1+ for TME 10, a new module integrating BEST/1 for UNIX into Tivoli Systems' TME 10 (Tivoli Management Environment). The TME integration module uses Tivoli's Integration Toolkit technology.

The BGS interface to TME 10 provides a common GUI on the TME 10 Desktop

to completely automate the installation, configuration, and operation of BEST/1 performance software within the TME 10 Environment. In addition, it provides tight integration of events, alarms, and automated responses so that only events that are exceptions from normal policies are passed to the management console. Further, TME 10 rules are provided to

automate responses to deviations from normal BEST/1 operations.

Contact BGS Systems, phone: (617) 891-0000, fax: (617) 890-0000, e-mail: best1@bgs.com.

Logistics Management

Wesley Software has announced TRACS*3.3, the Tactical Routing And

SCSI Hub

ATTO Technology, Inc. has announced ATTO AccelNet Ultra, a SCSI-based hub that allows multiple host systems to share centralized access to peripheral devices at transfer speeds of up to 40 MB/second.

ATTO AccelNet Ultra is an open system device that allows workgroup members to safely and easily access the same high-performance SCSI storage devices and RAID arrays. It is designed to eliminate the bottlenecks that exist in current workgroup environments and to provide a new level of fault tolerance and system availability. Using proven SCSI technology, ATTO AccelNet Ultra allows workgroup members

to transfer data at speeds many times faster than Ethernet, with centralized access to large files as though they were stored on local hard drives.

AccelNet Ultra also features hot-swappable host modules; scalability to 32 hosts; LED status indicators; support for single-ended and differential (optional) devices; fault isolation capabilities; and stackable, connectable units. ATTO AccelNet Ultra is priced starting at \$5,995.

Contact ATTO Technology, phone: (716) 691-1999, fax: (716) 691-9353, <http://www.attotech.com>.

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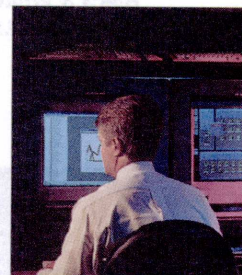
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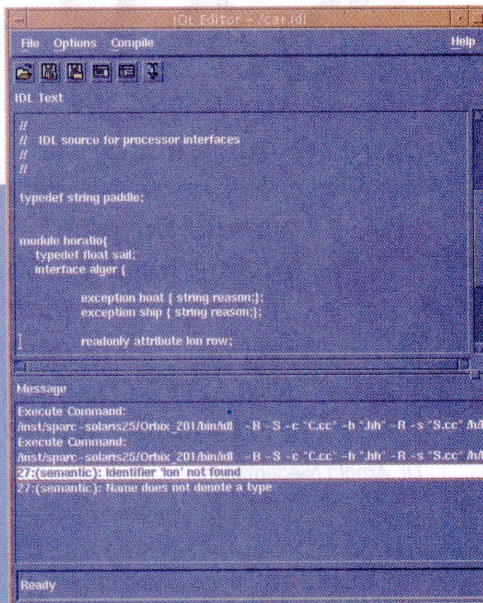
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**Black & White
Orb/Enable 2.2****CORBA 2.0 Productivity
Toolset**

Black & White Software has announced Orb/Enable 2.2, a productivity toolset that greatly simplifies CORBA application development with Orbix, IONA Technologies' CORBA-compliant object request broker (ORB). Orb/Enable allows the software developer to visually browse, manipulate, and manage CORBA information, reducing the need to know and remember coded interfaces. Release 2.2 includes C++ and Java code generation from compiled IDL descriptions, graphical viewing of CORBA interface repository contents, native Windows and UNIX support, automatic deployment of servers, and numerous ease-of-use enhancements.

Orb/Enable is compatible with any Orbix-based product; support is planned for additional ORBs. Per user pricing starts at \$1,500 on UNIX and \$995 on Windows.

Contact Black & White Software, phone: (408) 369-7400, fax: (408) 369-7406, e-mail: info@blackwhite.com, <http://www.blackwhite.com>.



Consolidation System. TRACS*3.3 offers five new modules: TRACS*Matcher, which monitors shipping activity over the entire distribution network to determine the optimal routing opportunities; TRACS*Splitter, which automates the process of analyzing very large or blanket orders, splitting them into the optimal combination of shippable groups; TRACS*Asset Manager, which automates the managing, logging, and tracking of equipment usage, maintenance, and locations for asset management; TRACS*Actuals, which captures actual shipping data and reconciles it with shipment plans in calculation of freight charges for payment and audit purposes; and TRACS*Costs, which automatically uploads the results from TRACS*Actuals to host systems for freight cost proration and/or payment.

TRACS*3.3 also allows users to optimize each leg of a multimodal shipment for greater control over the routing and freight costs.

Contact Wesely Software, phone: (203) 944-1600, <http://www.wesely.com>.

Desktop Video Conferencing

MDL Corporation has announced that it will manage all product distribution, support, maintenance, and upgrades of the Communique! desktop video conferencing product and OpenDVE. OpenDVE is based on the Digital Video Everywhere (DVE) software architecture that enables true interoperability between a variety of supported desktops, video compression algorithms, and networks such as Ethernet, ATM, FDDI, Frame Relay, SMDS, and ISDN.

MDL plans to upgrade Communique! and OpenDVE to incorporate the following new video conferencing standards: H.323, which provides high-quality audio and video at reduced bit rates over local networks; and T.120, which is the standard for application sharing of data over networks.

MDL will closely coordinate this software with its newly released, cross-platform, open system video capture product, SCSICAM. It runs on HP-UX and other UNIX workstations as well as Windows NT and Windows 95.

Contact MDL Corporation, phone: (425) 861-6700 or (800) 800-3766, e-mail: sales@mdlcorp.com, <http://www.mdlcorp.com>.

Parallel UNIX Sort

Innovative Routines International (IRI), Inc. has announced COSORT 6.0, its general cross-platform parallel sort software. COSORT 6.0 uses proprietary performance algorithms to fully exploit the latest CPU, memory, and disk combinations on all SMP UNIX platforms, including the HP 9000. Version 6.0 is up to three times faster than Version 4.5 and thirty times faster than the UNIX system sort command.

Version 6.0 features support for Year 2000 conversions through date field expansions and comparisons. The parallel sort engine will link directly to SAS and Micro Focus COBOL programs to replace their native sort functions without specification changes. COSORT uses the machine's locale-based collating sequence to process multibyte characters like German, Korean, and Russian.

COSORT's mainframe-based sort control language (*sortcl*) interface consolidates JCL sort parm conversion, data selection/extraction, data type transla-

tion, sort/merge, and extensive detail and summary reporting, all in a single pass.

Contact IRI, phone: (407) 952-9400, fax: (407) 952-9777, e-mail: cosort@iri.com, <http://www.iri.com>.

High Availability

Qualix Group, Inc. has announced QualixHA+ for HP-UX and IBM AIX/6000. The high-availability software features advanced clustering technology that provides application-oriented monitoring and recovery for clusters of up to eight servers.

QualixHA+ offers intelligent application-oriented HA monitoring and load-balanced recovery. Its integrated modules permit individual monitoring of specific database and critical application environments.

QualixHA+ Modules are available for the Oracle, Sybase, CA-OpenIngres, and Informix database environments; Apache, Netscape, and NCSA Mosaic Web servers; NFS servers; Tivoli TME 10; and Checkpoint Firewall-1. Additional resources can be defined by using an open API. Prices start at \$6,000 per node and vary according to the number of nodes in the QualixHA+ cluster and the options selected.

Contact Qualix Group, Inc., phone: (415) 572-0200, e-mail: info@qualix.com, <http://www.qualix.com>.

Web Metering

WRQ has announced Express PageMeter, reportedly the first Web tracker to see through both proxy and browser caches for accurate counts of Web site visitors. Visits from locally cached sites comprise up to 50 percent of all Web traffic, WRQ notes.

Express PageMeter is a Web site metering tool for Microsoft Internet Infor-

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*Johnnie-Mike Irving, General Manager
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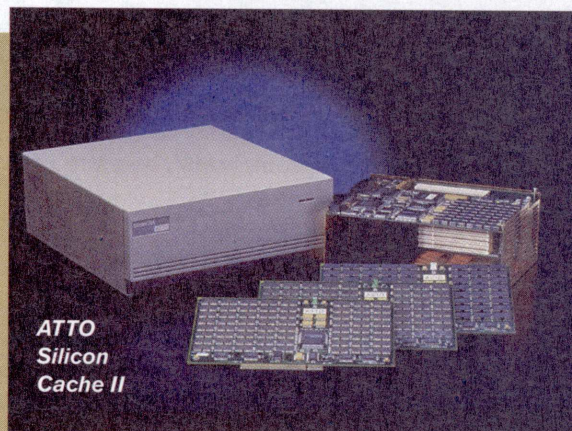
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SCSI Cache

ATTO Technology, Inc. has announced ATTO SiliconCache II, an inline Ultra/WIDE SCSI-3 hardware caching device that provides instant access (<0.1 millisecond) to most frequently used disk information. Physically residing between the host system's

SCSI port and its disk storage devices, ATTO SiliconCache II adds up to 1.6 GB of caching capacity to any SCSI-based environment.

ATTO SiliconCache II combines the fast speed of UltraSCSI with the instantaneous access time of DRAM memory to provide drastically reduced data access time and relief from cache management for the processor.

The ATTO SiliconCache II features transfer rates of up to 40 MB/second; complete operating system independence; and “write-through” design, which writes to both the cache memory and disk simultaneously.

Contact ATTO Technology, phone: (716) 691-1999, fax: (716) 691-9353, <http://www.attotech.com>.

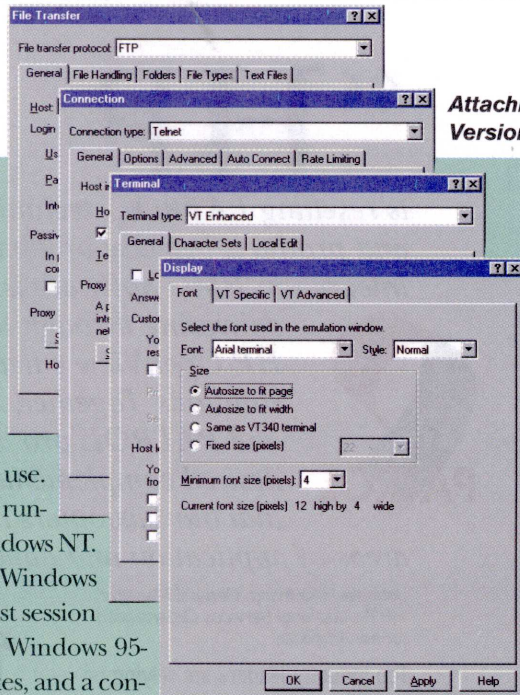
VT Emulation

Attachmate Corporation has announced KEA! 420 and KEA! 340 Version 5.0 VT emulation packages. Version 5.0 features an improved interface and enhanced utilities that enable better deployment, installation, automation, customization, and use. KEA! is now a true 32-bit product running under Windows 95 and Windows NT. KEA! Version 5.0 also includes a Windows 95-style wizard that simplifies host session connection and configuration, Windows 95-style configuration dialogue boxes, and a configurable toolbar that enables users to create custom configurations of KEA! for each host application.

KEA! also features a customizable menu that allows users to add and delete menu items, keyboard re-mapping capabilities, and a customizable SmartPad for quick access to host commands and sequences.

KEA! 420 Version 5.0 is priced at \$245. KEA! 340 Version 5.0 (includes graphics support) is priced at \$395.

Contact Attachmate, phone: (425) 644-4010 or (800) 426-6283, <http://www.attachmate.com>.



**Attachmate KEA
Version 5.0**

sive online help. Used as a stand-alone analysis tool or as the front end to the Java compiler, CodeWizard for Java also allows developers to control the violation output generation with a flexible suppression mechanism.

Beta versions of CodeWizard for Java are for Windows NT/95 and are available at <http://www.parasoft.com/wizard/evaljava.htm>, or via direct ftp.

CodeWizard V1.1

ParaSoft Corporation has announced the release of a beta version for CodeWizard V1.1, a C++ code analysis and coding standard enforcement tool. Some of the enhancements to CodeWizard 1.1 include a new C++ parser that supports the latest ANSI draft standard, stronger rule checking, and robust bug fixes. Windows-specific enhancements include CodeWizard's ability to install itself automatically in Microsoft and the presence of a Developer or Visual Studio button on the menu toolbar.

CodeWizard discourages bad coding practices and enforces good coding standards. It frees programmers from worrying about the details of the coding standard and allows them to concentrate on solving the task at hand.

CodeWizard V1.1 will be available for all major UNIX platforms and Windows NT/95 in the third quarter. The beta is available now.

Contact ParaSoft, phone: (818) 305-0041, fax: (818) 309-9048, e-mail: info@parasoft.com, <http://www.parasoft.com>.

Interface Engine

CAI (Century Analysis Inc.) has announced Version 3.0 of its interface engine, TDM, which features expanded platform support.

mation Servers and operates on the server and the client using either ActiveX or Java technologies. With Express PageMeter, the Web server is notified each time the page is requested, even when it is served from a cache. With other Web tracking tools, the Web publisher's site will record only the original hit by the first user and miss all subsequent hits, because these other tools do not count hits on pages served from cache.

Express PageMeter reports on the number of hits, the number of users, and the amount of time spent on each page or group of pages.

The preview edition of Express PageMeter is available for a limited time at <http://www.pagemeter.com>.

Contact WRQ, phone: (800) 872-2829 or (206) 217-7100, e-mail:

info@wrq.com, <http://www.wrq.com>.

New from ParaSoft

CodeWizard for Java

ParaSoft Corporation announced a pre-release version of CodeWizard for Java for Windows NT and 95. CodeWizard for Java is a source code analysis tool for Windows NT and 95. It enables developers to avoid poor language constructs and bad design decisions and is able to parse Java source code and look for coding violations according to its built-in standards.

CodeWizard for Java for Windows NT/95 is tightly integrated with Microsoft Visual Studio. This tool includes buttons that can be installed on the IDE's toolbar and comprehen-

It features new availability on Windows NT and Tandem NSK platforms, in addition to continued support of all major versions of UNIX. CAI is the only interface-engine vendor to support the three most common enterprise-system platforms, the company notes. Additional features of TDM 3.0 include: the ability to animate Windows GUI interfaces; ODBC support; a graphical SQL statement builder; a 32-bit object-based development environment for Windows 95/NT; and the ability to move disk or magnetic tape files through the TDM system.

Contact CAI, phone: (510) 680-7800, fax: (510) 676-6857, <http://www.cainc.com>.

Storage Management

Legato Systems, Inc. has announced NetWorker 5.0 for UNIX, a scalable product for storage management for platforms running backup, archive, and HSM.

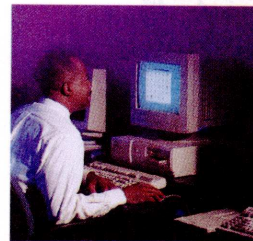
This release of NetWorker makes it easier to manage large numbers of different types of clients without increasing the management burden. Storage devices can be placed throughout the network as NetWorker storage nodes and can be managed as if they are locally attached. No indices will be kept at the storage node, making it easy to move tapes and data. Indices will also have the ability to span file systems, increasing the reliability of the NetWorker server overall without additional effort from the administrator. Also, NetWorker can now be localized for non-English speaking administrators.

Pricing for NetWorker 5.0 for UNIX starts at \$3,000.

Contact Legato Systems, phone: (415) 812-6000, fax: (415) 812-6032, faxworker: (415) 812-6156, <http://www.legato.com>.

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Data Management

Unidata, Inc. has announced Uni-data RedBack Release 1.4, now available under the Early Access Program.

New features are: Secure Sockets Layer support; support for sound and video objects; wizards for Form, Lookup, and Query Specification; user-defined templates; Web-based RedBack Gateway Administration; optimized HTML page refresh; and support for multiple validations on form fields.

Contact Unidata, phone: (800) UNIDATA or (303) 294-0800, fax: (303) 293-8880, <http://www.unidata.com>.

Digital Camera System

StarDot Technologies has announced WinCam.Live, said to be the first expandable and customizable digital camera system designed specifically for "webcam" usage. Webcams, or Internet cameras, snap live images that can then be viewed

with any Web browser. The update rate of these live cameras varies from once every few seconds to once a day. WinCam.Live uses the flexible RS-232 protocol for multiple camera connections and remote camera placement, including dial-up and wireless connections. StarDot also offers interchangeable lenses and an outdoor enclosure for use with WinCam.Live cameras.

Contact StarDot Technologies, phone: (714) 528-9719, fax: (714) 579-6641, <http://www.wincam.com>.

Programming Tool

EasiRun USA (sinc inc. and Compsoft International) has announced FlexGen-RAD 5.0 for DOS, Windows NT, and UNIX. FlexGen is a repository-based rapid application development environment for COBOL organizations.

This release enables the "Frontier" thin

Continued on Page 66



Question & Answer

Q: How can I determine the number of processors in my system?

A: For root users only:

```
ioscan -k | grep processor          (not for 9.xx on 700s)
echo `processor_count/D` | adb -k /hp-ux /dev/mem | tail -1
```

For other users:

```
sar -Mu 1    (will need some work to extract the quantity)
top          (not very good for a script)
```

Q: I need *frecover* to output the file listing from *-N* (the no-recover verification option) to a file. It doesn't seem to go to stdout.

A: *frecover*'s *-N* output is set up for stderr. Use the *2>* construct to redirect the data to a file as in:

```
frecover -rvN -f /dev/rmt/what_ever 2> /usr/tmp/some_file
```

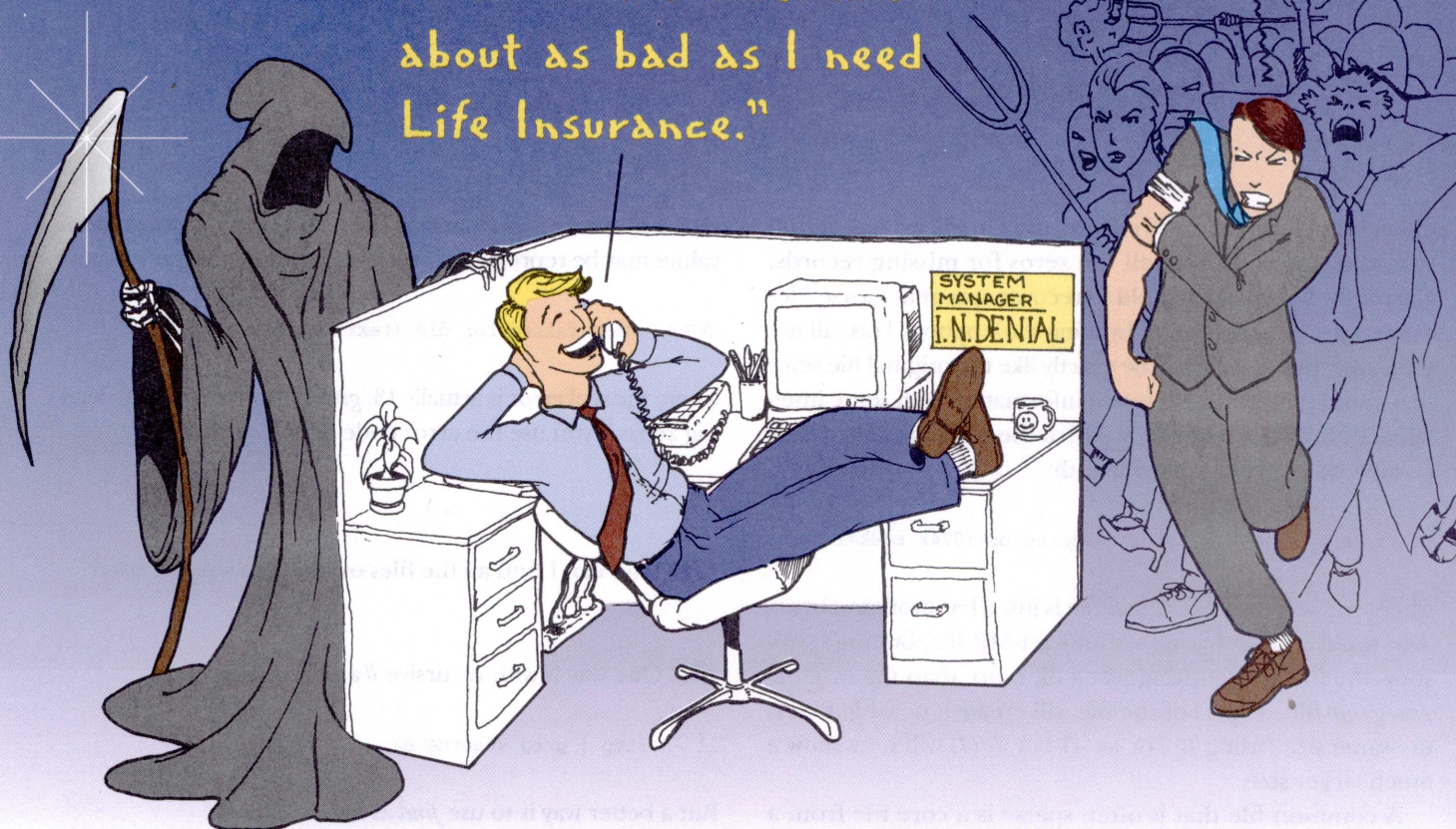
Q: I have backups that seem to occupy more space when restored. How can this be?

A: Sparse files. A sparse file is one that has been created with 'holes' or unwritten parts. Consider writing a file with record #1, then by seeking to record 1,000,000, writing another record and then closing the file. The file has but two records and occupies only a couple of blocks, but the missing parts are not stored or counted in *bf(1)* or *du(1)*. Depending on the size of the file and the sparseness, the difference in apparent versus actual size may be quite large.

To locate sparse files, you must search for files for which the difference between *wc -c* and the *du(1)* command is quite large. The *du(1)* command reads the file's disk space from the directory entries and represents actual space on the disk. *wc -c* reads the file sequentially, and the file system will supply the missing data records as a stream of zeros. On tapes where compression is not available, the space used on the tape will be much more than the apparent disk space.

On tapes with compression capabilities, the stream of zeros is compressed very

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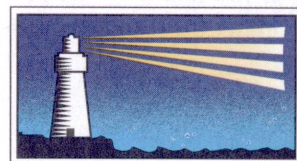
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efficiently. However, upon restore, the file will grow to its full size, the tape supplying all the zeros for missing records. Currently, *frecover* can be told to recover apparent sparse files without the streams of zeros by using the *-s* option. This will not guarantee that the file will be exactly like the original file since this would require saving inode information with some intelligence about the manner in which the file was created. It is possible to create a sparse file with:

```
dd if=/etc/group of=/usr/tmp/sparse bs=1024k seek=1
```

where you will see the original file is just a few thousand bytes. The result with *ls -l* or *wc -c* shows a 1-MB file, but *du(1)* will show the file as occupying just a bit more than the original */etc/group* file. A *cp(1)* of the file will create a new file that is the same size (using *ls -l* or *wc -c*) but *du(1)* will now show a much larger size.

A common file that is often sparse is a core file from a crashed program. Another file that might be sparse is */usr/lib/aliases.pag* (or */etc/mail/aliases.pag* for 10.xx). And of course, any programmer could write special code that creates a sparse file.

Q: What is an error 13?

A: Quite often (more than end users would like), programmers take serious shortcuts to reporting errors and they are often shown as just a simple number or perhaps a code such as *errno 13*.

This refers to the file */usr/include/sys/errno.h*, where the error numbers defined by HP-UX in response to system calls are defined. Here's a simple 1-liner to search for error numbers:

```
#/bin/sh
grep -i $1 /usr/include/sys/errno.h
```

If you name the script *errno*, then you can run it to decode either the number or the name as in:

```
errno 13
#define EACCES      13      /* Permission denied
*/
```

Not a lot more information, but it is a starting point. *errno* values may be represented as a long line of leading zeros as in:

```
ERROR: mmap failed for dld (text) errno:000000013
```

where the real error is actually 13. *grep* will try to match the leading zeros if you use the error code as is.

Q: How can I find all the files owned by a specific user?

A: One way is with recursive *ll* and *grep* as in:

```
ll -R /tmp | grep <username>
```

But a better way is to use *find* as in:

```
find /tmp -user <username>
```

It is significantly faster, uses less CPU time, and shows the full path name for each match, whereas *ll -R* piped to *grep* just shows the long listing of the specific file. If you want the same output as *ll* (but with the full path names shown), use:

```
find /tmp -user <username> -exec ll {} \;
```

This will also show symbolic links; the straight *find* just lists the link as an ordinary file name. You can also add additional info to the *ll* command such as the *-b* and *-F* option:

```
find /tmp -user <username> -exec ll -bF {} \;
```

Q: I'm setting up users' e-mail. What should I consider?

A: First, set up the */usr/lib/aliases* (*/etc/mail/aliases* for 10.xx) so that the root addresses are handled:

```
MAILER-DAEMON      : root
postmaster          : root
```



```
Postmaster      : root
nobody          : /dev/null
operator        : root
uucp            : root
daemon          : root
lp              : root
```

These are possible e-mail addresses that may be used by someone or some process. By sending them all to root, the superuser will see them. You may want to equate root to your sys admin superuser(s) e-mail account. After all, it is bad sys admin practice to perform non-sys admin tasks as root, and reading e-mail is perhaps one of those tasks. In that case, add a line such as:

```
root            : blh,abc
```

where users *blh* and *abc* will receive copies of all root e-mail. The white space around the colon is not important—the following are synonymous:

```
root            : blh,abc
root:           blh,abc
root:blh,abc
```

If you are setting up an applications server that may generate e-mail and users will not be reading their e-mail on that machine, you can put each user's login into the aliases file and alias it to the final address, as in:

```
blh: blh@atl.hp.com
```

Make a permanent forward in */usr/mail* as in:

```
echo "Forward to blh@atl.hp.com" > /usr/mail/blh
```

Put a *.forward* file in each user's *\$HOME* directory with the user's address as text:

```
blh@atl.hp.com
```

Q: I need a way to keep users from starting a shell from the limited program set that I offer. For instance, they are allowed to run *vi* but not a shell. Yet *vi* allows a shell prompt (with *!sh*

or something similar). What can I do to prevent this?

A: Set the *SHELL* variable to a text message such as:

```
SHELL="you are not allowed shell access"
export SHELL
```

Put this into */etc/profile* with tests for those users who are not allowed a shell prompt. Now when the user runs *vi* and types *!sh* or something similar, the message

```
No you are not allowed shell access
```

will be shown. The word *No* comes from the attempt to spawn a shell and is essentially saying, *No shell*, but the text in *\$SHELL* is repeated.

Q: On my 10.01 system, I set up Trusted Systems and now each new user gets the message: "Account disabled—see system administrator". What's the problem?

A: Get the patch PHCO_6261 to fix the problem, but as a workaround, use SAM to disable the inactive lock feature. Now users may access their accounts immediately. When you add the patch, or all current users have logged in at least once, re-enable the inactive lock to maintain security.

Q: Portions of my *inittab* file are not operating anymore. What's wrong?

A: If processes run once or respawn and are no longer working, */etc/inittab* may have been corrupted. Use the *cat -v* command to read the file and look for bad lines or lines with strange characters, especially at the end of the line.

Q: I mounted the *Applications* CD-ROM and *Extension*

CD-ROM on my server and exported it so other systems can use the CD-ROMs over the network, but *swinstall* fails, indicating that it cannot get a lock on the depot. What's up?

A: To maintain the integrity of a software depot, *swinstall* needs to lock the remote depot. However, the read-only CD-ROM cannot be locked since it cannot be written. The solution is to register the CD-ROM as a depot and then export it to anyone on the network with the *swagentd* program as in:

1. `mount /dev/dsk/<whatever> /mycdrom`
2. `/usr/sbin/swreg -l depot /mycdrom`

Note: this must be an SD format CD-ROM such as *Core* or *Applications*. If the CD-ROM has many formats (i.e., *Extension* disc) then register the depot at the beginning of the depot on the CD-ROM as in:

```
/usr/sbin/swreg -l depot /mycdrom/10.X/800/10.20/XSW800GR1020
```

3. Make sure *swagentd* is running (enable it in the startup scripts)
4. Now test to see if the depot is visible:

```
/usr/sbin/swlist -l depot (on the local machine)
/usr/sbin/swlist -l depot @remote.whatever (on remote machine)
```

Now everyone on the net can use the software.

Q: Why does a DAT or DDS tape on HP-UX not work on other UNIX systems, such as Sun Solaris, Unisys SVR4, and AIX? What I mean is, when I back up some files with the *tar* or *cpio* command on HP-UX, my data will not be recognized by the other UNIX system. But when I back up my system from a Unisys SVR4 server, my HP-UX server recognizes it.

A: There are two possibilities. One is that the DDS tape drive on HP-UX has hardware compression and the other UNIX systems do not have a compatible drive to read this compressed data. The solution is to use the no-compression device file on HP-UX to disable hardware compression.

The other possibility is that the block sizes are not compatible. Many versions of *tar* and *cpio* require matching record sizes and will not report the correct error message if the block size is not compatible. Look at the *tar* option *b*, and *cpio* option *B*.

Q: I administer many systems remotely. Several systems have multiple boot disks. How can I have my systems boot from an alternate path without user intervention at the system site?

A: The command *setboot(1M)* allows you to alter variables in stable storage. An automated boot will always boot from the primary path. However, you can temporarily designate another primary path with this command. With no options:

```
# setboot
Primary bootpath : 2/0/1.5.0
Alternate bootpath : 2/0/2.0.0
Autoboot is ON (enabled)
Autosearch is ON (enabled)
```

This command allows you to set the primary path, alternate path, autoboot, and autosearch.

Q: How can I copy a depot on tape to disk and vice versa?

A: To copy from tape to disk, you will use the *swcopy(1M)* command. The command can be run interactively. You will be prompted for a source depot and can select from the associated products. You may also run the command from the command line. This command will copy all products to a depot called */tape1*. The new depot is automatically registered by default.

```
# swcopy -s /dev/rmt/0m \* @ /tape1
```

Notice that the wildcard must have the preceding backslash so that the shell does not interpret it.

To copy select products:

```
# swcopy -s /dev/rmt/0m PROD1 PROD2 @ /tape1
```


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To copy from disk to tape, you will use the *swpackage(1M)* command. This command cannot be run interactively. To copy all of the products to tape:

```
# swpackage -s /depot1 -d /dev/rmt/0m -x target_type=tape
```

You can also transfer only select products:

```
# swpackage -s /depot1 -d /dev/rmt/0m -x target_type=tape PROD1
```

Q: What is the *lost+found* directory? I seem to have files in the directory that are taking up a great deal of disk space.

A: *lost+found* is automatically created by *newfs(1M)* and is used by *fsck(1M)* to deposit orphaned files and directories. The name assigned is the inode number.

It is very important that every read/write file system have a *lost+found* directory. Otherwise, *fsck(1M)* will not be able to salvage lost files.

Since the original name of the file is not available, *fsck(1M)* will use the inode number as a substitute name, and to prevent accidental removal of the file, the new name is preceded by a # character. This is a special character to the shell, so a preceding backslash must be used so that the shell does not interpret the character.

It is not easy to discern the name of the file. You have only data. First, use the *ll(1)* command to see the size, permissions, and ownership of the file/directory. You can also use the *file(1)* command with individual files. For ASCII files, you can examine the contents. For binary files, try using the *strings(1)* command.

Once you have determined the name of the file/directory, simply move it to the appropriate location:

```
# mv \#12345 /file/is/here
```

The *lost+found* directory must have empty slots in which entries can be made. This is accomplished by making *lost+found*, copying a number of files to the directory, then removing them before *fsck* is executed.

Q: How do I configure my system to save a system core dump? I'm using LVM on my system.

A: There are two types of space involved in saving a core dump. First, there is the dump area itself. This is often used as a swap area as well. Secondly, there is the file system that will house the dump after its transfer from the raw dump area.

Your dump area should be large enough to store the entire contents of RAM and the kernel. If the dump area does not have the necessary amount of space, the core dump will not contain all of the information. This may render it useless for analysis. If the dump device is too small, you will see a message similar to the following on bootup:

```
Warning: insufficient space on dump device to save full
crashdump. Should a crashdump be necessary only XXX of
XXXXXXX bytes will be saved.
```

The message will be saved in the circular kernel message buffer and may be displayed again by running */usr/sbin/dmesg*.

As you are using LVM, you need to create one or more logical volumes that will be used as your dump area. The logical volumes must reside in the root volume group. Each logical volume must be contiguous. As noted earlier, the logical volumes may be used as swap areas too. Use the *lvlnboot* command to designate the logical volumes for dump.

```
# lvlnboot -v
Boot Definitions for Volume Group /dev/vg00:
Physical Volumes belonging in Root Volume Group:
/dev/dsk/c0t6d0 (8/0.6.0) - Boot Disk
Boot: lvol1 on: /dev/dsk/c0t6d0
Root: lvol3 on: /dev/dsk/c0t6d0
Swap: lvol2 on: /dev/dsk/c0t6d0
No Dump Logical Volume configured
# lvlnboot -d /dev/vg00/lvol2
Volume Group configuration for /dev/vg00 has been saved in
/etc/lvmconf/vg00.conf
```

```
# lvlnboot -v
Boot Definitions for Volume Group /dev/vg00:
Physical Volumes belonging in Root Volume Group:
/dev/dsk/c0t6d0 (8/0.6.0) - Boot Disk
Boot: lvol1 on: /dev/dsk/c0t6d0
Root: lvol3 on: /dev/dsk/c0t6d0
Swap: lvol2 on: /dev/dsk/c0t6d0
```



```
Dump: lvol2 on: /dev/dsk/c0t6d0, 0
```

The `savecore(1M)` command is called during system startup from the `/sbin/init.d/savecore` script to transfer the core dump from the dump area to the file system. Options controlling this process are available via the file `/etc/rc.config.d/savecore`. There is also an option to write the core dump to tape, which may be preferable considering file system space limitations.

If the dump logical volumes are used exclusively for dump, you have the luxury of time to designate the destination of the transfer. Since the logical volumes are used only for dump, the information will not be affected by normal system activity. However, many people consider this a waste of space because it is used only when the system panics. More commonly, the logical volumes are used for swap and dump. So, the dump needs to be transferred to the file system or tape as soon as possible. It is possible that system paging will corrupt the dump.

Q: How do I change the name of an existing logical volume?

A: You can simply change the names of the associated device files. The names of the logical volumes are not stored in the LVM structures on disk. The minor of the device file is used to reference the appropriate part of the structures.

First, you will need to unmount the file system associated with the logical volume. If the logical volume is used for raw access, discontinue access during the procedure.

```
# umount /<mntpoint>
```

Move both the raw and block device files to the new name.

```
# mv /dev/vgXX/<oldname> /dev/vgXX/<newname>
# mv /dev/vgXX/r<oldname> /dev/vgXX/r<newname>
```

If a file system resides in the logical volume, modify `/etc/fstab` to reflect the new name. Otherwise, make the appropriate changes for raw access.

Q: I've just added a Seagate 325550W to my workstation running 10.01. I've noticed there is no `disktab` entry for this device. How do I create a file system?


A: This file is provided for backward compatibility with previous HP-UX releases. Its use is discouraged. At 10.X, `newfs` uses default parameters based on the size of the resulting file system. As a result, you need only provide the device file to the command. ■

General HP-UX questions are answered by Bill Hassell, a support engineer at the HP Atlanta Response Center. He can be contacted via e-mail at blh@hpuaerca.atl.hp.com. Workstation questions are answered by Susan Potter, an HP-UX system support engineer in the Atlanta Response Center. Her e-mail address is sup@atl.hp.com.



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CIRCLE 73 ON READER SERVICE CARD

SAMBA

LONG-TIME READERS WILL remember one of my more interesting rants about trying to connect several Microsoft Windows PCs with an HP-UX 9.04 server. A refresher: I had a couple of days between Christmas and New Years a few years ago to install three new 486/66 PCs and link them to our server. Initially we wanted to share printers, but quickly the users wanted to share disks also. Being a systems administrator, I also wanted an easy way to back up these systems. Basically, I spent several thousand dollars, tried half a dozen different NFS servers for the PC and finally settled on Chameleon NFS, which was the only one at the time that really worked. Chameleon worked well for us for several years, but had annoying habits, such as not cleanly reconnecting if the server was rebooted and freezing when transferring large files. At the end of the column describing this ordeal (my one-week project took four by the time it was over) I begged someone to develop a better integrated interface between Windows and UNIX. Well, this month I'll present the best solution I've found to that request: SAMBA.

What Is SAMBA?

SAMBA is a public domain "freeware" implementation of Microsoft's Server Message Block (SMB) protocol for UNIX. Written by Andrew Tridgell, it takes a different approach to integration: rather than forcing the PC to understand NFS, it allows UNIX to understand SMB. At first I thought this was odd. Why add another protocol and disk sharing method to UNIX when NFS works so well? Then I remembered the awful experience I had a couple of years ago and the problems I have whenever I try to do anything to Windows' networking. Suddenly another protocol didn't sound so bad.

How Does It Work?

Basically, SAMBA makes a UNIX file system look like a Microsoft Windows *share*. In Windows a share is a resource that the owner has exported to allow others to use. In the Windows world, setting up shares is trivial and doesn't require root permission, as NFS does. SAMBA allows the administrator to specify which file systems and printers are exported, with what permissions and to which users.

Just as when using NFS, the client doesn't know or care what operating system the server is running, only that the shares are available. My first thought after reading about SAMBA was, I hope they can support long file names and mixed case files. If the product didn't support these features, then its usefulness would be greatly diminished. Anticipating these requirements, SAMBA supports 8.3 mapping, long file name mappings, and a series of parameters for handling mixed case file names.

Obtaining SAMBA

As I said earlier, SAMBA is freeware. It is available from <http://lake.canberra.edu.au/pub/samba/samba.html>.

This site has source for SAMBA, pre-compiled binaries for most UNIX versions, all the man pages online, and digests of postings to the *comp.protocols.smb* newsgroup. You can also find a list of mirrors of the site so you don't download some large files from the other side of the world.

I recommend downloading the binaries and the source code. I didn't need to recompile the source code, so this saved some extra steps.

Follow the instructions on how to remove the application from the archive (hint, you'll need GZIP) and read all the man pages, README files, and installation notes.

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What's This About Pizza?

Since SAMBA is free, how do you show your appreciation for the work Andrew put into developing it? Why, send him pizza of course. Seriously. Look at the FAQ on the download site and you'll see that Andrew would like pizza in exchange for the use of the software. While it's not required or part of the licensing agreement (wouldn't that be interesting to explain to your boss!), if you find yourselves making extensive use of the software, consider ordering him a pizza. The FAQ has some ideas on how to do this.

Configuration

Once you have downloaded SAMBA and either installed the binaries or compiled the source, it is time to configure the SAMBA daemons. Basically SAMBA has two daemons running at all times: *smbd* and *nmbd*. These daemons are responsible for converting the SMB requests to UNIX disk accesses.

As I mentioned earlier, SAMBA has a lot of options that you can configure to tune the servers to meet your needs. The configuration is stored in the *smb.conf* file. The location of this file will depend on where you installed SAMBA, but it is usually found in */usr/local/samba/lib/smb.conf*.

The configuration file is divided into three sections: [global], [printers], and [home]. The [global] section defines global setup parameters for the entire SAMBA system—things like what security features to use, what systems are allowed (or not) to access this server's shares, and whether guests are allowed to log in.

The [printers] section defines which printers on the server are available to the outside world. Pretty basic stuff;

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there isn't a lot to configure here.

The [homes] section defines the level of access provided to a user's home directory. Since SAMBA must be configured to specify which shares are exported, it would be a major pain to specify each user's home directory. Rather, this section applies to all users so that when you add a new user, SAMBA automatically works. One thing to watch for: SAMBA requires a password for each user connecting to the server. It compares the user's name from the Windows login to the UNIX login and tries to verify that the user is a valid UNIX user. If not, it fails. Don't worry, SAMBA also has a mapping function in case the Windows login is different from the UNIX login.

After these three sections, you can add your own sections to define which UNIX file systems are exported.

A couple of tips: rather than trying to figure out what parameters are needed and where to place them in the file, check out <http://www.tiac.net/users/nassalm/index.html> for a useful, point-and-click *smb.conf* file creator. Thanks to Mark Nassal for providing this server. Also, try the *testparam* script in the *bin* directory to verify that your configuration is correct.

Finally, set up a script to start the *smbd* and *nmbd* daemons when the server reboots. The files will differ, depending on what operating system version you are using, so look at some of my past columns for examples of where to place the files.

Accessing UNIX Shares from Windows

Once SAMBA is installed and running, use a Windows 95 or Windows NT system to try to connect to the server. Using Windows Explorer, select 'Network

Neighborhood'; then look for the host name of your UNIX server. Opening it up (double clicking on it) will show the list of disk and printer shares you configured in your *smb.conf* file.

If you want to mount it permanently, select the Map Network Drive option in Windows Explorer.

Accessing Windows Disks from UNIX

Now that the Windows world can access the UNIX disks and printers, what about the other way around? The SAMBA distribution provided a program called *smbclient*, which provides an FTP-like interface to access another SMB enabled server. Note: *smbclient* can be used to test your SAMBA implementation or to access another SAMBA-equipped UNIX server.

There are also some contributed scripts to allow UNIX to print to a Windows printer and to back up a Windows share to a UNIX tape device, but I haven't had the chance to test them yet. I need the printing capability, so I'll be working on this in the next couple of weeks.

Shareware for Enterprise Deployment?

I'm sure I've piqued your interest, but many are probably thinking, This is shareware, no way will I trust my Enterprise to it. I thought so too at the beginning; then I found the 'SAMBA Survey' on the previously mentioned Web page. In this list are 1,300 companies that are using SAMBA, some of which have several thousand clients. Look at the list for yourself and see who is using it. For those who still aren't convinced, on the Web page there is a list of consultants who will sell you a support

contract and assist in installation.

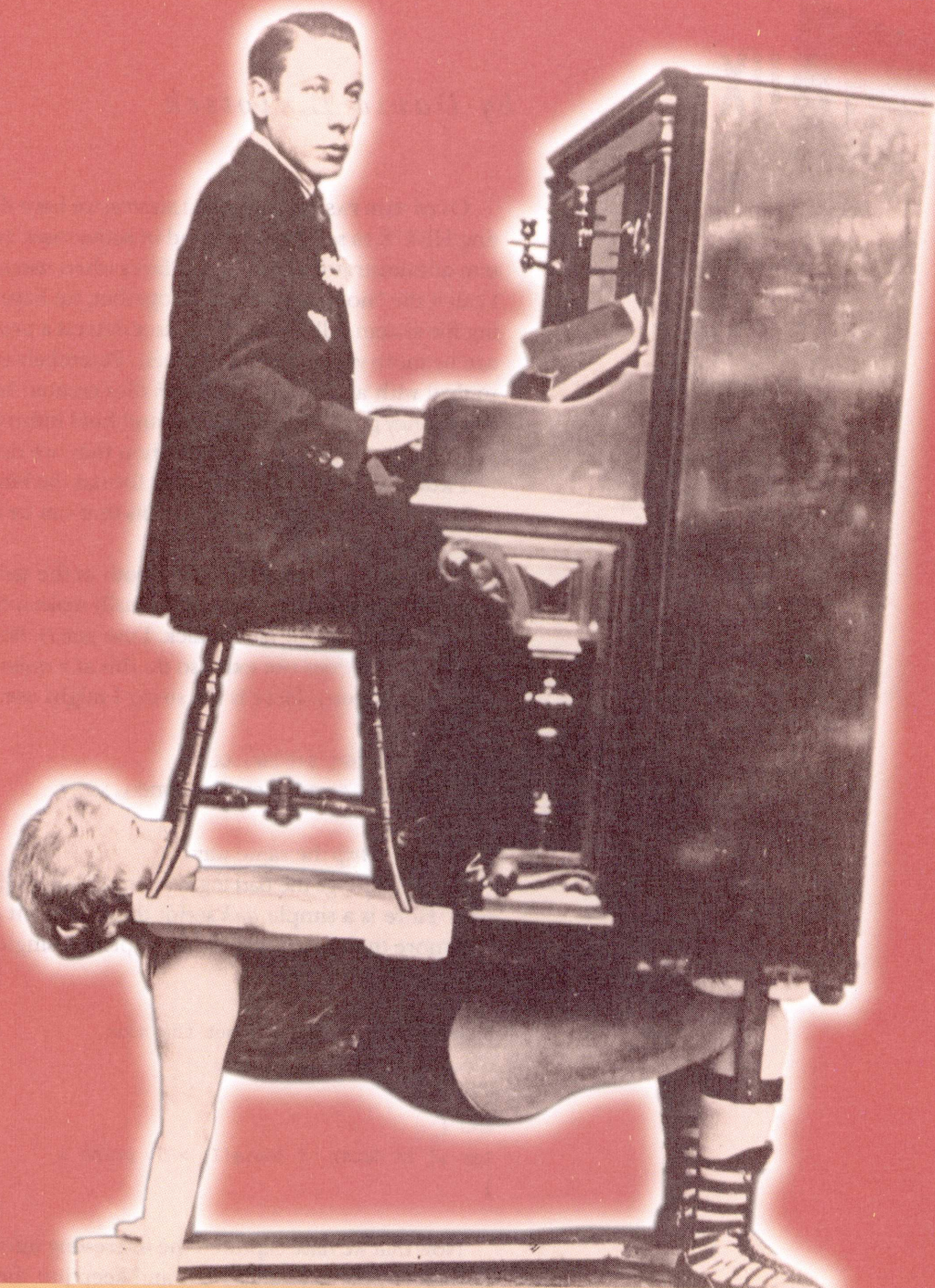
Finally, SUN has a product that sounds very much like SAMBA, but I've never used it, nor do I know of anyone who has.

A Quick Plug

Once I installed SAMBA, one of the first requests from users was to use it to develop software from the Windows environment. Anyone who has used Microsoft Visual C++ or Borland C++ knows how nice a GUI is for editing text. Being a hard-core UNIX programmer, though, I found using an IDE a pain, especially since I know *vi* inside and out. So I tried CodeWizard from Premia Software (<http://www.premia.com>). It supports a *vi* mode, has text coloring for C, C++, and COBOL, and deals with the CR/LF issues between DOS/Windows and UNIX. Nice tool, check it out.

That's it for this time. Please send me any comments about this column or ideas for future columns to ccurtin@mindspring.com. ■

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btmp and *wtmp*

OVER THE PAST FEW INSTALLMENTS, we have discussed some techniques for getting HP-UX to self-monitor (and in some cases, repair). There is a certain look system administrators get on their faces when users talk about the lack of disk space; I call it the “not again cringe.” Together, we have explored a technique for reporting file system fullness before a user detects a problem (at least the computer itself can be more vigilant than the users). Potentially some of the most pesky types of file to deal with are those binary *tmp* files created by the system. You know *btmp* and *wtmp*. They grow without bounds and hold information that causes the security officer to hit new vocal crescendos when they are deleted.

I would like to show you how to format the binary data into ASCII and then give you a couple of simple *awk(1)* scripts that can be used to extract useful reports and clean them up.

Fortunately, *btmp* and *wtmp* are both in the same format, so we can use the same program to get them into ASCII. I usually make a copy of the file before I begin. Since the process is usually fairly quick, I use *mv(1)*. Be aware that logging does not happen if the file does not exist, so do this at a quiet time on your system (in terms of users logging on). Here is the string I might use:

```
mv ${BTMP} ${BTMP}.OLD
fwtmp < ${BTMP}.OLD > ${BTMP}.ASCII
```

Format *wtmp* the same way.

Since *btmp* logs the bad login attempts, we might wish to report before we discard data. Here is a simple *awk* script that will print out the names of users who have had more than five bad login attempts in a single hour that appear in the data file:

```
{
split($10, hour, ":") # get the hour
data[$8, "", "$9", "hour[1]]++
}
END {
for (I in data) if (data[I] > 5) print I
}
```

Now that we have captured the interesting information, let's drop the content that does not apply to real user IDs and keep just the last *n* bad login attempts for real users. First, we need to get a list of the real user IDs:

```
BTMPLIST=$(awk '{print $1}' ${BTMP}.ASCII | sort -u)
for USER in ${BTMPLIST}
do
    if id ${USER} > /dev/null 2>&1
    then
        # We have a valid user id
        print "${USER}"
    fi
done > ${VUSER_FILE}
```




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The above shell fragment will put the valid user names into the file pointed to by `$(VUSER_FILE)`. The next `awk` script will load those valid users into the array `vu`. It will then test each record of `$(BTMP).ASCII` against the valid user array and keep the last `n=5` records (it takes advantage of the fact that the data in the ASCII file are in date order).

```
# Process the first file (the one with real login names)
NR == FNR {
    vu[$1]=0
}

# Second file is ASCII btmp data
NR > FNR && $1 in vu {
    for (i=5;i>0;i-)
        data[$1,i]=data[$1,i-1]
    data[$1,0]=$0
}

END {
    for (user in vu)
    {
        for(i=5;i>-1,i-)
            if (data[user,i] != "" )
                print data[user,i]
    }
}
```

You will need to sort the output of the above `awk` script by the date and time fields (`awk` stores arrays in hash tables and things never come out in sorted order). Now, put our shortened (?) file back:

```
ftwmp -ic < $(BTMP).TRIMED > $(BTMP)
```

Do not forget to deal with the permissions on `btmp`.

Dealing with `wtmp` is very similar. To truncate the file, I merely strip out anything that is not the past and current month (nothing fancy):

```
sed -n /<prev_month>,<next_month>/p $(WTMP).ASCII
```

However, you might want to modify the `awk` script used for `btmp` to keep just the last valid login of every user. Do not forget to format the ASCII file into binary and put it back.

Since computers are good at repetitive tasks, they are much more diligent and accurate than humans. If you set up the `cron` entries, you can even get a step ahead of those pesky users. But, you can choose to categorize the nagging you cause the computer to generate just as you do user complaints: `/dev/null`. ■

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Don't

-9!

(The sys-admin's **killer instinct**)

by Yitshak Merin

Background

I have met and worked with hundreds of UNIX system administrators. Starting as a user, I always looked at the local sys admin as a guru. He always knew much more than anyone else, and no one ever dared to think twice about what he did.

Then I was a sys admin myself for a few years. Naturally, at this stage no one respected the sys admin anymore. So I had to prove to everyone that what I was doing was right.

For a few years now I have been supporting system administrators.

I have yet to meet a sys admin who has passed a single working day without using the *kill* command. Most of them (or should I say most of us?)

automatically add -9. Why do we do it?

I have asked many of my colleagues, "Why do you *kill* -9?" The automatic answer is, "I want a sure kill!"

So, What Is *kill*?

The answer is not automatic. One thing is certain: *kill* does not kill a process!

kill is one of those utilities that historically have a misleading name. The sole purpose of *kill* is to send a signal to a process. So how did it get the name?

When receiving a signal, a process can behave in one of three ways:

- Terminate (default behavior for most signals). Free resources used by the process, flush all files and exit.
- Trap the signal. Execute some code that the programmer attached to the particular signal.

kill (Collins Dictionary (i))—To kill a person, animal, plant or other living thing means to cause the person or thing to die.

kill (Collins Dictionary (ii))—If you kill an activity or process, you completely destroy or end it.

kill (HP-UX 9.x man page header)—terminate a process

kill (HP-UX 10.x man page header)—send a signal to a process; terminate a process

killer instinct (Collins Dictionary)—A killer instinct is a great determination to get what you want, even though getting it might involve causing harm to other people.

So, there are many definitions of the term *kill*. Which one is correct for UNIX systems?

My claim is, None of the above! All the above definitions are wrong, including the one in the man page. The 10.x man page header is a step forward, but still it is wrong.

- Ignore the signal. Don't do anything.

A properly written application does not use the default behavior even if it does want to terminate. Instead, the signal is trapped and the application executes an orderly shutdown.

Why -9? Is It the "Killer Instinct"?

There are two signals that cannot be trapped or ignored.

1. The *SIGKILL* signal causes the process to terminate immediately. No cleanups are made and resources are returned to the system only if the system claims them back. This signal is sent to the process by a *kill -9*.
2. The *SIGSTOP* signal causes the process to stop executing and wait for a *SIGCONT*. When it receives a *SIGCONT*, it continues to execute from the point it stopped. The *SIGSTOP* signal is sent by a *kill -24* or pressing ^s (control-s). The *SIGCONT* signal is sent by a *kill -26* or pressing ^q.

Most system administrators know this. Still, they *kill -9*. The general excuse is: "I have tried *kill* without -9 many times, and it did not work."

Friends, colleagues: This is wrong!

If *kill* fails to terminate a process, the reason is that the process is ignoring the signal or trapping it and running some commands that might eventually terminate the process. A much better attitude is to try to find out why the *kill* failed to terminate the process.

Sometimes *kill -9* will fail also. What can cause this?

1. This is a "defunct" process, also called a zombie process. This process has exited, either by normal termination or following a signal, but the process parent has not yet called *wait* for the child. This process is already "dead" but is taking up a process table entry until the parent process calls *wait* (see *wait(2)*). You can fire as many signals as you want, including *SIGKILL*, with no effect. There is not much you can do to clean this up, other than redesign the badly behaved application.
2. If the process is blocked on I/O or some kernel resource/activity, there is nothing you can do at this stage to terminate it. Examples:
 - When *tar(1)* is rewinding a tape, it will ignore any signals (includ-

ing -9) until the *iocd* has finished. The only effect of issuing any form of *kill* at this stage is that the signals get stacked, and when the rewinding is over, all the signals are issued at once.

- A hardware error on a disk causes I/O to hang forever; no *kill* will get you out of that.
3. Sometimes the *kill* seems to have failed, but actually the process has terminated and another process has replaced it. The symptom of this is that the process has a different PID after your attempt to kill it. In this case, you should find out what caused the new process to start. There can be two causes for such behavior:
 - The process is in */etc/inittab* with a *respawn* entry. Then the *init* process periodically checks for the process and respawns it. To get rid of this:
 - Remove or comment out the entry from *inittab*
 - Reread *inittab* (*init q*).
 - Kill process
 - Another process reinvoked this application. This could be a script or a shell executing a loop. I can't give you much help here; you have to find the "bad guy." It could help to find the parent id (using *ps*).

My recommendation is: When you want to terminate a process run

```
kill <pid>
```

This issues a signal *SIGTERM* (-15).

If this does not terminate the process, wait a few minutes and only if the same process is still alive, issue a *kill -9*. Even then, do it with caution and never to a process you do not know.

Why not -9?

Here are some examples of problems that might occur. Most of them are taken from the basic documentation on HP-UX machines; some are from my experience when I was called in to clean up the mess caused by someone killing -9. (OK, I admit, sometimes it was me.)

The consequences of this action can be any of the following:

- Files are not flushed to the disk. This means that some data could be lost.

- Tables are not clear. If the process consumed system resources that are kept in a table, the resources are not returned to the system. See some examples later.
- The memory consumed by the process itself is returned to the system because of the memory-handling algorithm used by UNIX systems. But if this process is a subprocess of some daemon that does not die, the parent process may not know about the 'death' of the son and still hold memory for it.
- The dying process has no way of informing other processes of its expected termination. This could lead to problems in other processes.
- IPC (Inter Process Communication) allocation problems can occur. Shared memory and semaphores may not be returned to the system.
- Temporary files may be left forever.
- Device files may be marked used, thus preventing new processes from acquiring them. See examples below.
- File systems may stay mounted, thus forcing you to reboot some remote systems to get rid of the mounts.
- Security problems can occur as some setuid applications may leave files around in a mode allowing unauthorized users to access them.

Following are some examples of real problems that are known to have happened.

Automount

Never kill the *automount* daemon with -9. This is well documented in the *automount(1M)* man page and in the *Installing & Administering NFS* manual. Doing so causes any processes accessing mounted directories served by *automount* to hang. The only way to recover from this action is to reboot the system.

Terminal Emulators

Try opening a terminal emulation (*hterm*, *xterm*, or *dtterm*) in the background. This adds an entry in */etc/utmp*. Now you can see the pseudo tty with the command *who*. Many administrators have written scripts that depend on the output of *who*. This is useful for sending a message to all logged-in users, finding out who is logged in, etc. When you kill the terminal emulator, the *utmp* entry is cleared and *who* does not show the process anymore. But if you kill the emulator with a *SIGKILL* signal, the *utmp* entry is not cleared, causing *who* to issue wrong output. Any script depending on *who* will now fail or (worse) show wrong results.

Cooperating with Other Processes

When a process terminates, it typically informs its parent process and its child processes of its termination. A *SIGKILL* prevents this. This can cause problems both with the parent and the child.

fbackup is the standard utility on HP-UX for backing up files. When you invoke *fbackup*, it invokes a few child processes. The exact number and type of these can vary according to the physical location of the tape drive. If you *kill -9* the parent process, all the child processes will continue running. This is an example of a situation in which *kill -9* will not stop the job, while a plain *kill* will.

If you are using some Distributed Management Agent Platform (Such as HP OpenView) and you kill a managed process with -9, the parent process does not know about it. (This problem can occur when *ovspsmd* is shut down with the *kill -9* command.)

IPC, Shared Memory, and Semaphores

ftio(1) is a fast tape I/O tool that operates using System V shared memory and semaphores. The resources committed to these functions are not freed automatically by the system when the process terminates. *ftio* does this only when it terminates normally. Thus, if *ftio* receives a *SIGKILL* signal, system resources used for shared memory and semaphores are not returned to the system.

SNaplus3270 provides the standard functionality of an IBM 3270 terminal on an HP-UX workstation. If this process is killed with *SIGKILL* signal, it is known to leave behind IPC allocation problems.

To stop SNA processes use *SNaplusmanage* or plain *kill*.

Device Files Stay Busy

ocd is the outbound connection daemon for data terminal controllers (DTC). Often used for terminal servers, *ocd* normally creates and removes device files. However, if the process is killed incorrectly, such as with *kill -9*, the device file may remain.

From the DTC user manual:

If the kill -9 command is used, you will have to remove the device file manually from the /dev/telnet directory using the HP-UX rm command. Therefore, the kill -15 command is more complete.

Temporary Files

Many applications use temporary files:

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Total capacity	up to 586GB	200GB to 7.5TB	2.08TB	2.08TB
Bar code reader	Yes	Yes	Yes	Yes/6-digit
Number of drives	1 to 3	1 to 5	2 to 4	2 to 4
Head life (hours)	>20,000	>20,000**	10,000	10,000
Media uses (passes)	20,000	20,000	15,000	15,000
Drive MTBF (hours)	200,000	200,000	80,000	80,000
Tape drawer(s)	Yes	Yes	No	No
Removable tape boxes	Yes	Yes	No	No
List price starting at	\$7,995	\$13,995	\$17,995	\$45,000

* Exabyte's recommended 8mm tape—Exatape 170M Advanced Metal Evaporated tape
Sony's recommended 8mm tape—SDX-T3N 170M Advanced Metal Evaporated tape

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- to keep data during the process run
- to prevent running multiple copies of the same application
- to prevent conflicting processes from running simultaneously
- to serve as a primitive lock for the use of some other file

When the application terminates, the temporary files are deleted. If you kill it with *SIGKILL*, files may be left on disk. At the least, this causes a waste of disk space. Far worse, this can prevent you or others from running the application later.

Examples:

- *vi* uses */tmp* for edited buffers. The files */tmp/Ex** are temporary *vi* files. These files can get very big. Killing the *vi* process will leave these files on disk.
- The command *vipw* ensures single editing of the *passwd* file (*/etc/passwd*). To ensure that no one else edits this file, the temporary lock file */etc/ptmp* is created. If this file exists, the password file cannot be edited. This prevents all users from changing their passwords.

Make a small test as the root user:

```
vipw
Kill -9 <vipw pid#>
```

Now try (as an ordinary user) to change your password. This will fail.

Remove the file */etc/ptmp*. Now change the password. This works.

Think about the poor user. He does not know all this. He is only trying to change his password because you keep telling him he should.

If you are thinking, "We are using NIS on our systems, so our users change the passwords with *yppasswd* and I am safe," you are wrong. The command *yppasswd* uses the same */etc/ptmp* file. As a matter of fact, the same symptom can appear if you *kill -9* the *yppasswd* daemon (*yppasswdd*) while it is updating the *passwd* file.

Security and Privacy Issues

The standard utility for reading mail is *mailx*. The more common mail readers such as *elm* and fancy graphical interfaces are just front ends to *mailx*.

mailx generates temporary files (in */var/tmp* on HP-UX 10.x or */tmp* on 9.x) as *mailxAAAA14126*. These are ASCII

files. These files are created in mode 666 and sometime during the processing changed to 600. If *mailx* is killed -9, the files may stay in a mode that makes them viewable by anyone.

This could expose your incoming or outgoing mail to any user on the system.

File Systems Stay Mounted

The daemon *rex* is used for RPC-based remote execution. For its correct execution, it may use NFS to mount the needed remote directories. This mount is intended to be temporary for the duration of the command. When the command has completed executing, *rex* attempts to *umount* whatever file system it has mounted. If *rex* has received a *SIGKILL* signal, it will leave the directory mounted. See *man rex(1m)* for details.

How Does HP-UX Kill Its Processes?

We have already seen that the authors of the man page did not do a great job with choosing the headers. Let's see what their friends did in some other HP-UX tools.

HP-UX 10.x has an excellent facility for shutting the system down. Most of the scripts in */sbin/init.d* have a stop option. I was curious to see how these scripts kill the various daemons they need to terminate. All these are from a standard 700 10.10 system. Most of the scripts "behave" themselves and use *kill* or *kill -TERM*.

These were found to be naughty and use *kill -9*:

MEls
SNMP utilities (*SnmpHpunix* & *SnmpMib2* & *SnmpMaster*)
laserrx

Two of the scripts came up with an interesting solution. From */sbin/init.d/i4lmd*

```
kill_pid()
{
    typeset sig
    typeset seconds
    for sig in 15 9
    do
        kill -$sig $pid
        seconds=12
        while
            [[ $seconds -gt 0 ]]
        do
```



```

        kill -0 $pid >/dev/null 2>&1 || return 0 # Success
        seconds=`expr $seconds - 3`
        sleep 3
    done
done
return 1 # Could not kill process
}

```

Kill -0 is not a kill signal. Rather it checks whether the process is alive or not. So, *i4md* tries to kill the process with a *-15*, then gives it 12 seconds to terminate. If that fails, it tries *-9*, and waits 12 more seconds. If that also fails, it gives up and returns a failure code.

From */sbin/init.d/xfs*

```

"stop") PIDS=`ps -e | awk '$4 == "xfs"
                {print $1}`
[ -z "$PIDS" ] && exit 0
kill "$PIDS"
sleep 5
kill -9 "$PIDS" ;;

```

This tries to kill the process, then sleeps 5 seconds and kills it with a *-9*. If the first kill did the job, the second one fails, but who cares?

Some More HP-UX Applications

Killall

An interesting exception is *killall*. */sbin/init.d/killall* calls */usr/sbin/killall* which, in turn, sends a *-9* signal to all processes except for some exceptions listed in *man killall*. Since this is part of the shutdown process itself, it probably does not leave around any problems.

Softbench

Behavior of *Softbench* build when you press 'terminate': The first time the button is pressed, *softbuild* sends a *SIGQUIT* (3) to the *make* process. The second time it is pressed, *softbuild* sends a *SIGKILL* (9) to the process.

leave

I will end this article with a positive use of *kill -9*.

leave is one of those processes from the early days of UNIX. Back in the late 1970s and early 1980s, when most UNIX users were in universities, *leave* would remind you when you had to go to a class (or home). You would "catch" a terminal, start doing your job, and forget the time. *leave* came to the rescue by prompting you for a time, and then reminding you a few minutes before your deadline. When you were late (we all were), *leave* would become such a nuisance that you would do anything to kill it.

From *man leave*:

The leave command ignores interrupts, quits, and terminate signals. To get rid of it you should either log off or use kill -9 giving its process Id.

Of course, no one uses *leave* with all the nice GUI tools we have now. The author must have thought, "I finally got someone to use this code, why should I let him get rid of it easily?" ■

Yitshak Merin is a systems engineer at the HP-UX Response Center in Tel Aviv, Israel. He has been working on various UNIX platforms for 10 years, developing software and administering systems. He can be reached by e-mail at: tsachi@hpcms.co.il.

Look Out ISDN, Here Comes ADSL



ADSL, Asymmetric Digital Subscriber Line, works over existing copper telephone wires to your home and promises download speeds around 9 Mbps and upload speeds of 640 kbps. ADSL was actually developed in the late 1980s to compete with cable modems (cable TV).

We will cover the basics of the technology and current and projected service availability and pricing. A few Regional Bell Operating Companies (RBOCs) already offer the service and many are currently running pilot evaluations. ADSL could blow ISDN out of the water during the next two years. We will also review product availability and standards.

Background

Bellcore, the Baby Bells' research arm, developed ADSL in 1989. The original spec eight years ago specified data rates of 1.5 Mbps downstream (from service provider to end user) and 16 to 64 kbps upstream (from end user to service provider). Fast forward to 1997; the data rates are now up to 9 Mbps downstream and 640 kbps upstream and length sensitive. The technology was originally conceived for Video on Demand to compete with the cable TV industry. Along comes the Internet explosion with increasing user demand for downstream bandwidth, increasing WAN and LAN demands from businesses, and presto, a technological solution in the form of ADSL appears as an answer to our bandwidth needs! Fiber to the doorstep is still a long way off and prohibitively costly. Cable modems are just slowly starting to appear along with the requirement of major system upgrades for the cable providers. Cable modems may provide 30 Mbps, but remember, this is shared bandwidth among many users and you know

all about our Monday through Friday morning and evening commute traffic jams. ISDN, Integrated Services Digital Network, is currently widely available in most major metropolitan areas but still may not be available in many rural areas.

Some of you may have the luxury of accessing the Internet from work at T1 (1.5 Mbps) speeds only to go home and crawl on the Net via your 33.4 or 28.8 kbps modem. Actually, I have yet to see my 28.8 modem hook up at 28.8 kbps speed. Most of the time, I end up at 21 kbps speed. Some may even have the luxury of ISDN (128 kbps)—Net surfing speed, much improved compared to analog modem speed, but still a far cry from T1 speed access.

The A in ADSL stands for *Asymmetric* because of the different upstream and downstream data rates. Some people have confused the A with *Asynchronous*. ADSL is actually a synchronous (clock timed) technology.

You can make some very interesting technical and economic comparisons between ISDN and ADSL, as you can see in *Table 1* and *Figure 1*.

ADSL Alphabet Soup

ADSL is sometimes referred to as xDSL. *Table 2* explains the different "x" DSL prefixes. HDSL has actually been in use for almost two years as a T1/E1 service Feeder within the service area. Some xDSL services may require two or three twisted-pair lines. The last letter, L for *Line*, does not actually refer to the copper line but to the modem or the modem pair equipment connected to the ends of the line, or "loop."

Are you DiZzY from all the acronyms yet? ATM=Automatic Teller Machine, or does it really mean Another Telecom-

munications Medium? (ATM=Asynchronous Transfer Mode.)

ADSL has a range of downstream speeds depending on distance:

Up to	18,000 feet	1.544 Mbps (T1)
	16,000 feet	2.048 Mbps (E1)
	12,000 feet	6.312 Mbps
	9,000 feet	8.448 Mbps

18,000 feet, the distance from the customer site to the CO (Central Office), covers virtually every subscriber in some countries. In the United States, 18,000 feet covers less than

80 percent of the subscribers. The remaining 20 percent have subscriber loop lines with loading coils. The loading coils must be removed for any DSL service, including ISDN. The average subscriber also has 22 splices in the wiring as the multipair cables are more concentrated moving toward the CO; i.e., a 50-pair cable may be spliced to a 200-pair cable which may later be spliced to a 1000-pair cable.

Most telephone companies have had programs to shrink average loop length for years, mainly to extend the capacity of existing central offices. Typically, a remote access node installed in an area reduces the subscriber loop length to less than 6,000 feet. The remote access node may be connected back to

TABLE 1 *ADSL vs. ISDN*

COMPARISON

ADSL

ISDN

Bandwidth data rate (kbps)

1500 downstream, 640 upstream

128 up and downstream direction
(2 × 64 kbps)

Telco Central Office (CO) switch upgrade required

No, ADSL overlays onto the existing network. ADSL uses the existing copper infrastructure and can be scaled as needed in the CO.

Yes, ISDN requires a digital switch in the CO such as an AT&T 5ESS or a Northern Telecom DMS100.

POTS access (Plain Old Telephone Service)

Yes, the original 0-4 kHz voice frequency bandwidth remains separate. Passive or active filters separate this portion out, allowing POTS access even if the ADSL modem fails and POTS usage does not consume any of the ADSL bandwidth.

Optional Extra: ISDN equipment actually has to provide additional Digital Signal Processing to remodulate the digital signal back to an analog POTS line. POTS usage requires 1 B channel (64 kbps of bandwidth).

Current Availability

Almost nonexistent. Many Local Exchange Carriers (LECs) are piloting ADSL. A Chicago ISP actually is offering availability now.

Widely available in most metropolitan areas. May not be available in many rural areas.

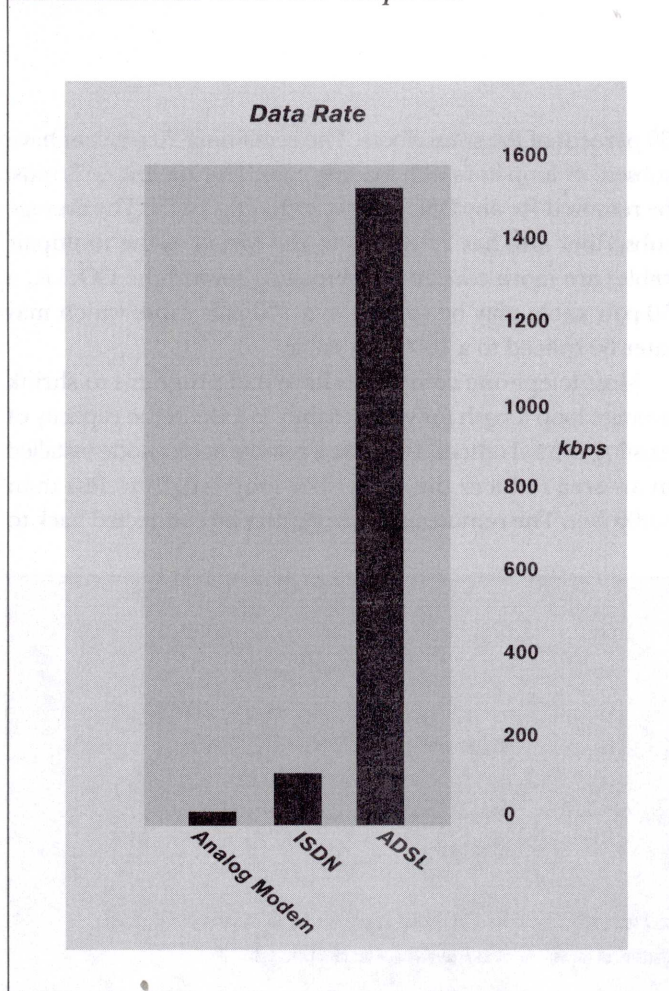
Equipment pricing and monthly operating costs

Equipment is available from many vendors and is on the order of \$1000-\$3000. Costs are projected to drop to \$500 to \$1000 over the next 12-18 months as chip sets become available.

Equipment is available from many vendors and depending on features, ranges in price from \$100 up to \$2000. ISDN equipment mainly for PC to Internet connectivity can be had for \$100 to \$400.

Monthly operating costs are projected to be as low as \$30 up to the \$100s.

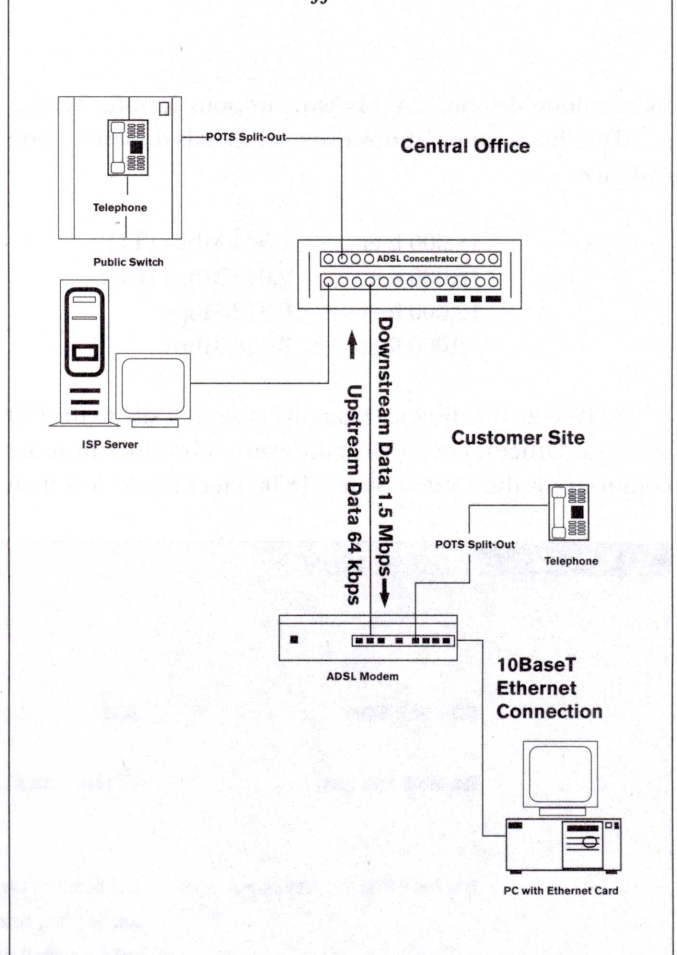
Monthly operating costs depend on the LEC and range from \$25 to \$100s depending on time and usage.

FIGURE 1 Bandwidth Comparison

the CO via fiber or T1/E1 lines (now using HDSL). Upstream speeds (from the user back to the network) range from 64 kbps to 640 kbps. The POTS bandwidth from 0 to 4 kHz is undisturbed and independent and can still work even if a customer's ADSL modem fails or is interrupted by a power failure. This is not the case with an ISDN modem.

ADSL Basics

ADSL provides a large data pipe downstream and a small data pipe upstream. This is very suitable where high data rates are needed from the server end to the user, e.g., for accessing files or data or Web downloads. User data upstream is usually small and slow—Web requests on the Internet, for example—although video conferencing is one application that could fill up the smaller upstream pipe. ADSL modems currently available provide a 10BaseT Ethernet connection and/or V.35 interface. An ATM interface will soon be released. A POTS splitter is usually integrated within the ADSL unit to provide voice service (see Figure 2).

FIGURE 2 Typical Overview, Service Provider and Central Office to Customer

ADSL Technology

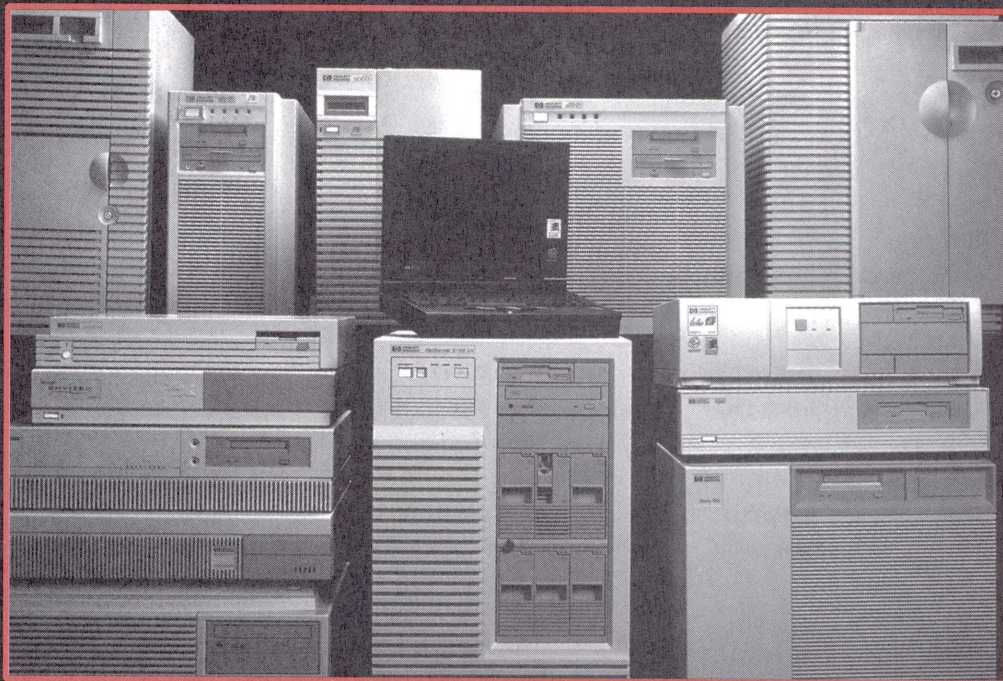
How does ADSL cram so much more data through a pair of cables? POTS only utilizes from 0 to 4 kHz of frequency bandwidth. Twisted pair copper wire will actually support over 1 megaHertz of frequency bandwidth, although long telephone lines may attenuate signals at one MHz by as much as 90 dB. One MHz is the upper edge of the band used by ADSL. Advanced digital signal processing and creative algorithms provide ADSL with the horsepower to utilize the large dynamic ranges, separate channels, and maintain low noise figures (see Figure 3).

Standards Controversy: VHS vs Betamax or DMT vs CAP

Remember the videotape format wars between Beta and VHS? Well we all know what happened to the Beta format. ADSL utilizes two incompatible modulation techniques—Carrierless Amplitude and Phase modulation, or CAP, and Discrete MultiTone, or DMT.

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TABLE 2

"x"-DSL Prefixes

NAME	MEANING	DATA RATE	APPLICATIONS
DSL	Digital Subscriber Line	144 kbps (up to 18,000 ft, farther with repeater)	ISDN service, Voice and data communications
HDSL	High data rate Digital Subscriber Line	544 kbps (2 pairs) 2.048 Mbps (3 pairs) (up to 18,000 ft)	T1/E1 service Feeder plant, WAN, LAN access, server access
SDSL	Single line Digital Subscriber Line	1.544 Mbps or 2.048 Mbps (up to 10,000 ft)	Same as HDSL plus premises access for symmetric services
ADSL	Asymmetric Digital Subscriber Line	1.5 to 9 Mbps downstream 64 to 640 kbps upstream (up to 18,000 ft)	Internet access, video on demand, simplex video, remote LAN access, interactive multimedia
VDSL	Very high data rate Digital Subscriber Line	13 to 52 Mbps downstream 1.5 to 2.3 Mbps upstream (up to 4,500 ft)	Same as ADSL plus HDTV

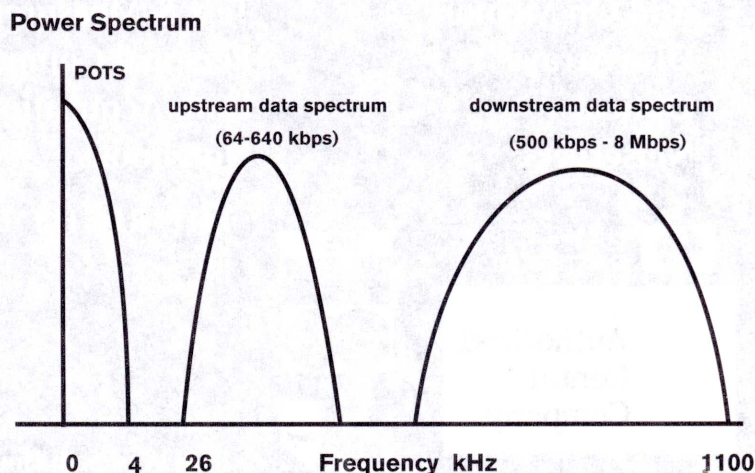
CAP was here first, developed by AT&T Bell Labs, and now owned by GlobeSpan Technologies. CAP is a single-carrier modulation technique that utilizes large pipes and echo cancellation. ADSL has three frequency ranges: 4 kHz for POTS, 75 kHz for upstream data, and 900 kHz for downstream data. DMT breaks the large pipes into multiple side-by-side 4-kHz channels spaced every 4.3 kHz (0.3 kHz gap between channels) and utilizes Frequency Division Multiplexing, FDM. Think of DMT as having a few hundred analog modems in parallel, a super inverse mux pipe.

DMT is technologically more robust and resistant to noise but is currently more expensive. Chip sets have recently become available for vendors. A CAP chip set is more highly integrated and already evolved through second generation improvements and currently less expensive, although the chips are available only

from Lucent. DMT will pump higher data rates than CAP and can direct data away from channels with too much inter-

ference. DMT chip sets are available from several sources: Alcatel, Analog Devices, Motorola, and Texas Instruments.

FIGURE 3 ADSL Frequency Distribution



DMT has a finer grain of rate adaptation, 32 Kb increments verses 100 Kb steps for CAP. DMT also has higher immunity to impulse noise and provides for a very flexible adjustment of power spectral density (to avoid interference with existing services).

Standards

DMT, which was developed by Amati Communications, became ANSI standard T1.413 in 1993. GlobeSpan, along with Bell Atlantic and Nynex, has tried to get the T1E1.4 working group to create a second standard for CAP, but the idea was shot down. The following year the European Telecommunications Standards Institute (ETSI) also endorsed DMT as the standard for ADSL. The companies producing DMT chipsets are committed to fully interoperable chips and systems and created an interoperability forum in July 1996 to guarantee full interoperability.

In December 1994, a group of companies formed the ADSL Forum to address issues that fall outside of the standards bodies, domain. The Forum currently has 175 members world-wide. The ADSL Forum is neutral in the DMT/CAP battle and was formed to advance the worldwide deployment of ADSL by:

- facilitating development of interoperable end-to-end ADSL-based network components
- identifying services suitable for ADSL transmission
- promoting the ADSL concept as one of the strategic means of interactive multimedia transmission

Conclusions

ADSL should deploy quicker and more smoothly than ISDN did about four years ago. Since a digital switch

upgrade is not required for ADSL, and can be overlaid on the existing infrastructure and scaled as needed, ADSL should achieve a more rapid deployment once hardware prices and monthly service charges hit critical mass. Business use of ADSL for metropolitan WAN remote communications and remote office access should be more cost effective than traditional leased line services such as T1 or 56k. Internet access by schools and small businesses will also drive the need for speed.

ADSL should blast off during late 1998, given reasonable monthly costs from service providers and lower hardware costs from improved chip set integration.

DMT should eventually beat out CAP once better levels of integration and cost competitive chip sets arrive, given the higher more robust technological and

standards support and competition among the DMT chip set suppliers. ■

Kevin B. Wong is a system engineer with the East Bay Municipal Utility District.

Reference Web Sites for ADSL Information

ADSL Forum - 198.93.24.23
www.westell.com
www.aware.com
www.alcatel.com
www.mot.com/SPS/MCTG/MDAD/adsl/adsl_whitepaper.html—
 Motorola, Debbie Salles
www.inforworld.com/cgi-bin/displayArchives.pl?dt_iwe52-96_49.htm—Anne Knowles

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Network File System (NFS) as Part of HP-UX and Windows NT Interoperability

By Marty Poniatowski

When introducing Windows NT into an established HP-UX environment, you have a variety of technologies available that enhance Windows NT and HP-UX interoperability. Two widely used HP-UX technologies that are also available on Windows NT from a variety of sources are the X Window System (X Windows) and Network File System (NFS). I will cover NFS in this article; X Windows was covered in the May/June issue of *hp-ux/usr*.

These two technologies come with the HP-UX operating system. Running them under Windows NT bridges the gap between some fundamental differences in operation between the two operating systems. Although there are many other important interoperability topics, and more products being introduced every week, I have decided to focus on these two because they are so widely used in the HP-UX community and because of the maturity of the Windows NT products.

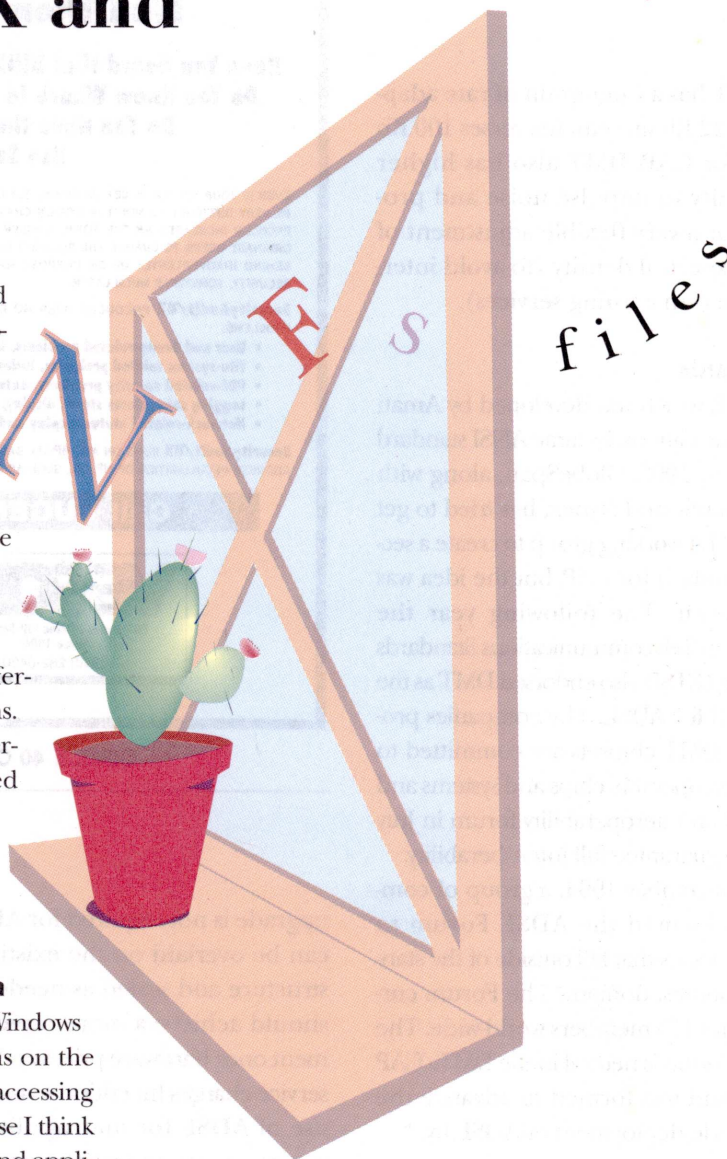
Network File System (NFS) Used to Share Data

NFS comes with HP-UX and by loading NFS on a Windows NT system, you can freely access HP-UX file systems on the Windows NT systems and vice versa. I focus only on accessing HP-UX file systems on the Windows NT systems because I think it is more likely the HP-UX system will act as a data and application server and the Windows NT system will act as a client. There is, however, no reason that NFS could not be used to access Windows NT file systems while on an HP-UX system.

NFS Background

I am not going to limit the discussion and examples in this article to NFS. There are other services used to share files that are also useful, such as File Transfer Protocol (FTP) which I'll show examples of as well.

NFS allows you to mount disks on remote systems so they appear as though they are local to your system. Similarly, NFS allows remote systems to mount your local disk so it looks as though it is local to the remote system.



NFS, like X Windows, has a unique set of terminology. Here are definitions of some of the more important NFS terms.

Node—A computer system that is attached to or is part of a computer network

Client—A node that requests data or services from other nodes (servers)

Server—A node that provides data or services to other nodes (clients) on the network

File System—A disk partition or logical volume or, in the case of a workstation, possibly the entire disk

Export—Make a file system available for mounting on remote nodes using NFS

Mount—To access a remote file system using NFS

Mount Point—The name of a directory on which the NFS file system is mounted

Import—To mount a remote file system

Before any data can be shared using NFS, the HP-UX system must be set up with exported file systems. The `/etc/exports` file in HP-UX defines which file systems are exported.

This file has in it the directory exported and options such as “ro” for read only and “anon,” which handles requests from anonymous users. If “anon” is equal to 65535, then anonymous users are denied access.

The following is an example `/etc/exports` file in which `/opt/app1` is exported to everyone but anonymous users, and `/opt/app2` is exported only to the system named system2:

```
/opt/app1 -anon=65534
/opt/app2 -access=system2
```

You may need to run `/usr/sbin/exports -a` if you add a file system to export.

Although we are going to focus on exporting HP-UX file systems to be mounted by Windows NT systems in this article, there is no reason we could not do the converse as well. Windows NT file systems could be mounted on an HP-UX system just as HP-UX file systems are mounted in Windows NT. Remote file systems to be mounted locally on an HP-UX system are put in `/etc/fstab`. Here is an example of an entry in `/etc/fstab` for a remote file system that is mounted locally. The remote directory `/opt/app3` on system2 is mounted locally under `/opt/opt3`:

```
system2:/opt/app3 /opt/app3 nfs rw,suid 0 0
```

You can use the `showmount` command on HP-UX systems to show all remote systems (clients) that have mounted a local file system. `showmount` is useful for determining the file systems that are most often mounted by clients with NFS. The output of `showmount` is particularly easy to read because it lists the host name and the directory that was mounted by the client. The `showmount` command has the three following options:

- `-a` prints output in the format “name:directory” as shown above.

FIGURE 1 Hummingbird Maestro

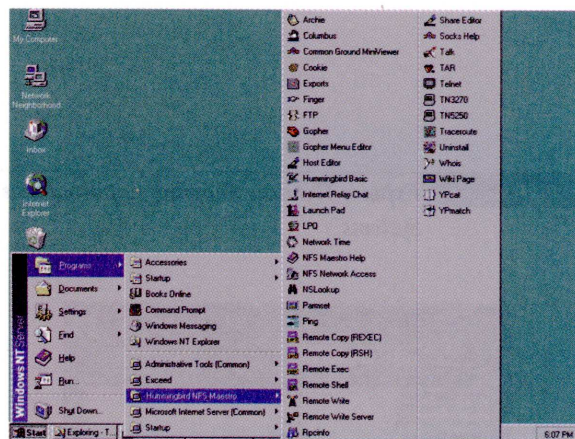
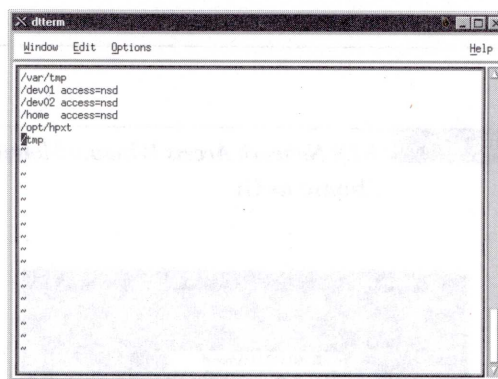


FIGURE 2 `dterm` Window Showing `/etc/exports` on HP-UX System



- `-d` lists all of the local directories that have been remotely mounted by clients.
- `-e` prints a list of exported file systems.

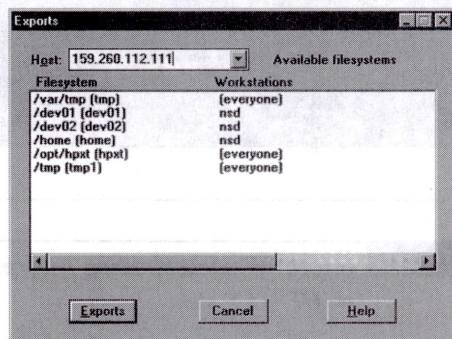
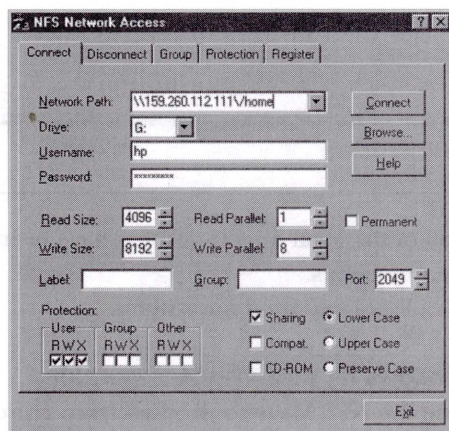
Using Windows NT and HP-UX Networking

I will use the NFS Maestro product from Hummingbird Communications Ltd. on Windows NT to demonstrate the networking interoperability in this article. Figure 1, shows the menu for the Maestro product after I installed it.

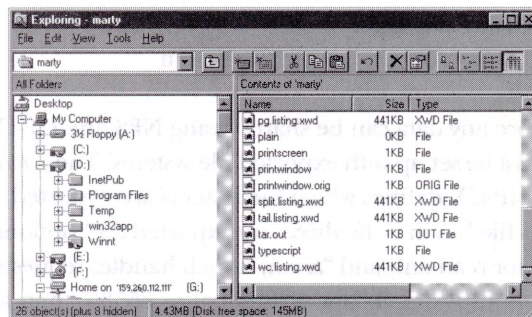
As you can see, much more than NFS functionality is part of Maestro. I will cover some additional functionality later in this article.

Before we use NFS with our Windows NT and HP-UX systems, let's first see what file systems we have available to us.

Using the `dterm` from the previous article, we can sit at the Windows NT system and open a window into the HP-UX system. Figure 2 shows opening a `dterm` and viewing the `/etc/exports` file.

FIGURE 3 Exports Window Showing Exported File Systems**FIGURE 4** NFS Network Access Window Mounting /home as G:

There are several file systems exported on this HP-UX system. Some, such as `/opt/hpvt` and `/tmp`, have no restrictions on them; others do have restrictions. We don't, however, have to open a *dtterm* in order to see this file. We can use the Maestro menu pick *Exports* to bring up the window shown in Figure 3. You can use the IP address as shown in the figure or the host name to specify the host on which you wish to view the exported file systems. You can see that this window takes the

FIGURE 5 Windows NT Explorer Showing /home as G:

`/etc/exports` file and clarifies some of the entries. The entries for which there are no restrictions now have "(everyone)" associated with them.

Now we can specify one or more of these exported file systems on the HP-UX system that we wish to mount on the Windows NT system by using the NFS Network Access from the Maestro menu. Figure 4 shows mounting `/home` on the HP-UX system on the G: drive of the Windows NT system.

After you hit the Connect button in the window, you will have `/home` mounted as G:. You specify the system and file system you wish to mount with Maestro by two slashes preceding the IP address or system name, another slash following the IP address or system name, and then the name of the file system you wish to mount. I used the IP address of the system. To view all of the mounted file systems on the Windows NT system you could invoke Windows Explorer.

Figure 5 shows several file systems mounted in an Explorer window. This window shows `/home` on drive G:. On the right side of the window is a listing of files in `/home/marty` on the HP-UX system. These files are now fully accessible on the Windows NT system (provided the appropriate access rights have been provided). You could now manipulate these HP-UX files in Explorer on the Windows NT system just as if they were local to the system. This is a powerful concept: to go beyond the barrier of only the Windows NT file system and freely manipulate HP-UX files.

An example of how you might go about using Explorer is to copy a Windows NT directory to HP-UX. Figure 6 shows two Explorer windows. The top window has an *exceed* directory on

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the Windows NT system that is being copied to a directory of the same name on the HP-UX system in the bottom window. As the copy from the Windows NT system to the HP-UX system takes place, a status window appears showing the name of the file within the *exceed* directory (*exstart1.bmp*) being copied.

FIGURE 6 Copy a Windows NT Directory to HP-UX Using Explorer

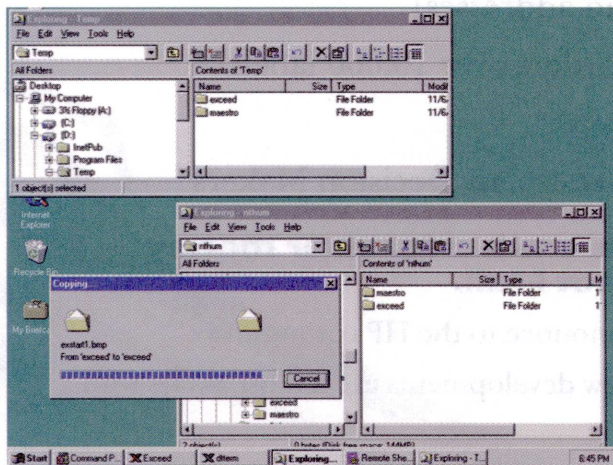


FIGURE 7 Establishing a Connection to HP-UX from Windows NT

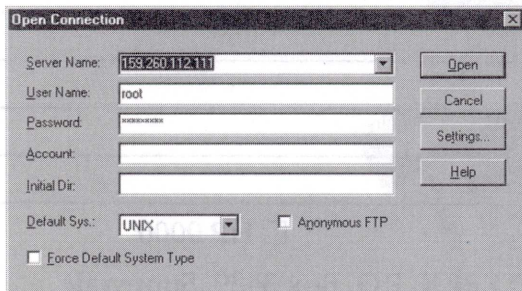
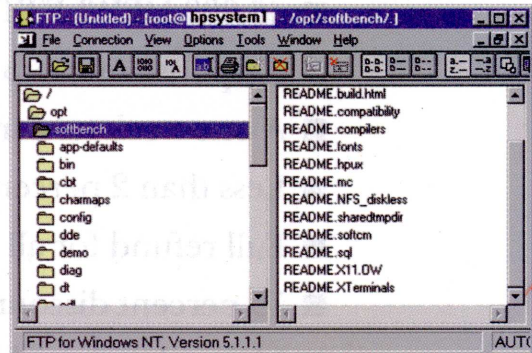


FIGURE 8 Viewing the /opt/softbench Directory Using FTP Windows

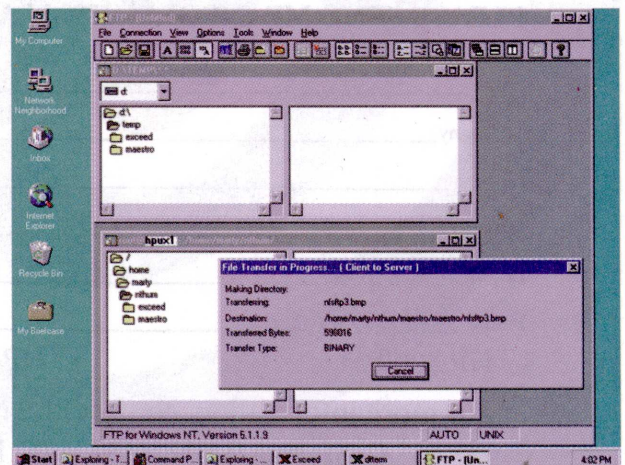


This copy from Windows NT to HP-UX using Explorer demonstrates the ease with which files can be shared between these two operating systems.

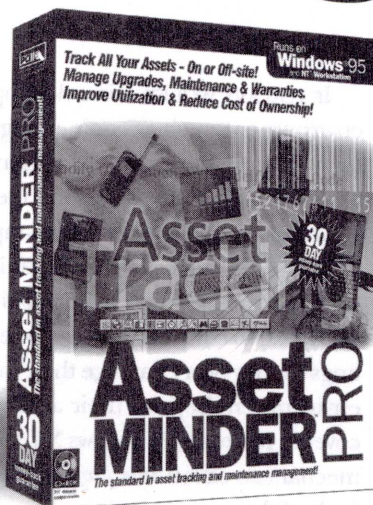
File Transfer Protocol (FTP)

I started this article covering NFS on Windows NT and HP-UX for interoperability because NFS is the predominant means

FIGURE 9 Using FTP to Copy Directory from Windows NT to HP-UX



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of sharing files in the HP-UX world. NFS is used almost universally to share data among networked HP-UX systems. NFS allows you to share data in real time, meaning that you can work on an HP-UX file while sitting at your Windows NT system. This is file sharing. You can also copy data between your Windows NT and HP-UX systems using FTP. This is not file sharing; however, the FTP functionality of Maestro makes it easy to transfer files between Windows NT and HP-UX.

Figure 7 shows the window that you would use to establish a connection to an HP-UX system from Windows NT.

After the connection has been established, a window appears in which you can traverse the HP-UX file systems while working at your Windows NT system. Figure 8 shows viewing the `/opt/softbench` directory on an HP-UX system through the FTP window.

You can also copy files graphically using FTP. You can open two FTP windows and copy files and directories from one system to the other. Figure 9 shows copying the directory `d:\temp\maestro` on the Windows NT system to `/home/marty/nthum/maestro` on the HP-UX system. This was performed using the icons in the two windows. The maestro directory did not exist on the HP-UX system and was created as part of the copy.

You can select a variety of options when running FTP. Notice in Figure 9 that the "Transfer Type" is binary. This is one of the options I selected prior to initiating the transfer.

Although this functionality is not as extensive as the file sharing of NFS, it is widely used to copy files from system to

system and therefore can play a role in Windows NT-HP-UX interoperability.

I used icons to specify the information to be copied in this example. You also could have used the FTP command.

The two interoperability technologies X Windows and NFS are just the beginning of what you can implement when bringing together HP-UX and Windows NT. Since most HP-UX installations use X Windows and NFS, these technologies may be the best to implement initially; and because these products have been out for many years for non-UNIX based systems, you will be working with mature products that take into account the many

nuances of heterogeneous computing environments. ■

Marty Poniatowski is a Hewlett-Packard technical consultant in the New York Area who works on both server and workstation installations. He has written over 50 technical articles in computer industry trade publications. He has also written four books published by Prentice Hall: The Windows NT and HP-UX System Administrator's "How To" Book (1997); Learning the HP-UX Operating System (1996); HP-UX 10.x System Administration (1995); and The HP-UX System Administrator's "How To" Book (1993). All can be ordered by calling (203) 377-4746.

User Profiles

IF YOU ARE WORKING in a development environment, such as engineering or IT, users are sophisticated and commonly personalize their screen settings. On the other hand, if you are supporting computers deployed throughout your organization and your users aren't as sophisticated, you'd like to control the users' screen settings so they don't damage their working environment beyond their ability to recover it. Microsoft Windows NT 4.0 has a mechanism called *user profiles* to assist in both of these scenarios.

User profiles are environmental settings for each individual user's working environment. Each user has his own profile so that when different users log onto an NT computer, they will each be presented with their personalized desktop environment. Profiles include display properties, desktop items, START menu configurations, mouse settings, window sizes, window positions, network shares, and printer connections.

Both users and administrators benefit from profiles. The profile saves the settings and recalls them each time a user logs on, yielding the preferences that that user had. Since each user has his own profile, multiple users can log onto the same computer and they will all get their personal settings. And if a profile is set up as a *roaming* profile (I'll explain roaming in a bit), users will get their preferences no matter which computer they log onto.

For the administrator, user profiles can be used to define common settings for groups of users. Or the administrator can assign specific custom profiles to a specific user. But the most important administrator capability is in limiting users with *mandatory* profiles. Mandatory profiles are profiles the user is assigned by the administrator which

the user cannot alter.

The three types of profiles are local, roaming, and mandatory. By default, profiles are local unless specified otherwise. Local profiles store the settings a user makes on the local computer. If the user moves to another machine, the profile does not follow and a new one must be created. Local user profiles are kept in the `\winnt\profiles\<username>\` directory under the file name *Ntuser.dat*. Note that `<username>` is the logon account name, and that `winnt` is the `%systemroot%` value. In the case where there are identical user names (such as from different domains), the second user name has `000` appended to it to make it unique. A third identical user name would have `001` appended to it, and so on.

A *roaming* profile is one that is kept on some server, allowing access to the profile from any workstation in the domain. The administrator or account operator sets a roaming profile through "User Manager for Domains" by setting the path for the profile to a server path. The profile type can be modified in the System Properties, User Profiles screen using the Change Type button (see *Figures 1 and 2*). Whenever that user logs on, NT will read the profile from the server instead of the local default directories. The profile file name is still *Ntuser.dat*.

A *mandatory* profile is a roaming profile that the user cannot change. Mandatory profiles are created much the same way that roaming profiles are, except that the created file name is renamed. The profile file name must use the file extension `.man`. Therefore the *Ntuser.dat* becomes *Ntuser.man*. Mandatory profiles can be used for an individual user or for a group of users. Administrators generally use mandatory



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profiles to reduce the amount of system maintenance by ensuring a good desktop configuration. They are also useful in limiting user access and functionality. (Note that you use System Policies to limit user capabilities. But that's another topic.)

Profiles consist of two primary parts. The first part, kept in the *Ntuser.dat* file, is the copy of the user's registry settings. These registry settings are a copy of the *HKEY_CURRENT_USER* subtree for this specific user. The second part is the set of folders under the *\winnt\profiles* directory. Sets of the folders are kept under the profile name. For example, the Desktop files and shortcuts for *rcc* are kept under the folder *\winnt\profiles\rcc\Desktop*. See Figure 3. Other folders include *\Favorites*, which contains shortcuts to program items and favorite locations, *\NetHood*, which contains network neighborhood connections, *\PrintHood*, which contains printer connections, *\Recent*, which contains shortcuts to the most recently used files, *\SendTo*, which contains shortcuts to where to send items, and *\Start Menu*, which contains the Start button pop-up menu tree.

Any program items that are common to all users on the computer are kept in the *\All Users* folder. Typically these programs are listed in the lower, common section of the Start, Programs pop-up menu. The *All Users* profile items are added to the actual profile used.

The first time a new user logs on, and doesn't have a roaming or mandatory profile, a template profile is used to initialize the user environment. Upon log off, an actual profile file and folders are created under the current user name. This template profile is under the *\Default User* folder. The administrator can tailor this profile for initial desired defaults.

Any time a user modifies the profile, the changes are made in a transaction log file named *Ntuser.dat.log*. When the user logs out, the changes are applied from the transaction log file to the user profile file *Ntuser.dat*. The transaction log file will also apply the changes to the profile when the user logs back in, if the computer blew out for some reason.

NT provides a certain amount of intelligent profile processing if a user logs on from a slow connection, such as a modem. If the user has logged on from this workstation before so that there is a local copy of the roaming profile, and the server profile will take more than two seconds to copy to the local computer, the user will be presented with a dialog box asking if he wishes to wait for the server copy or use the local copy of the profile instead.

FIGURE 1

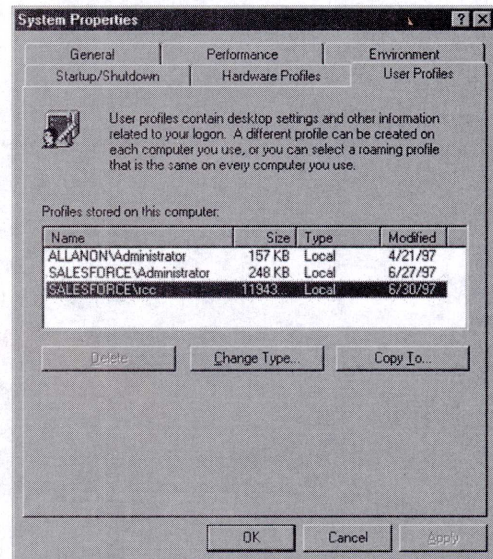
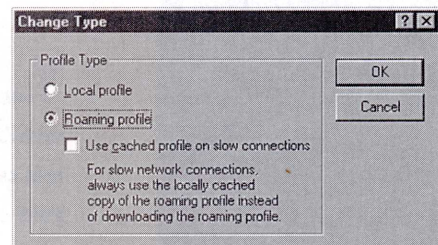


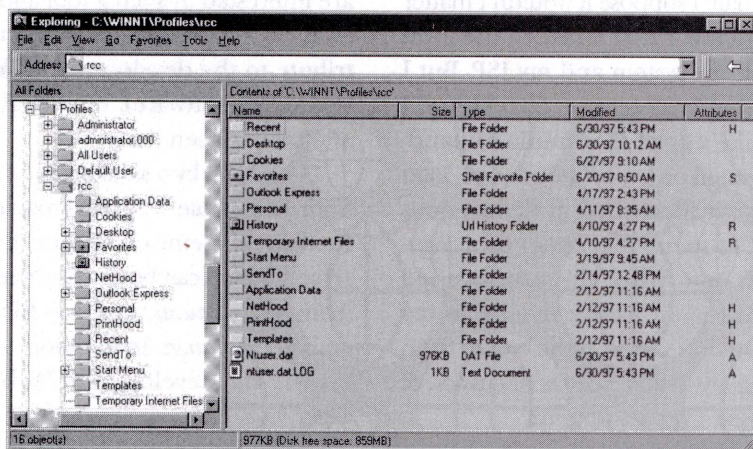
FIGURE 2



Unless the profile is a mandatory profile, the user will normally have permission to write changes back to the profile file. The administrator should normally take away write permissions from mandatory profile files and group profiles. The problem with allowing write access to a group profile is that each user's changes will be seen by the entire group. So if you're creating a group profile, you may want to write protect the profile file from the group.

It's rather common for Windows NT domains to include Windows 95 users. NT will support 95's profiles, but with some

FIGURE 3



features missing. For example, Windows 95 cannot have common program groups or a Default User profile. Windows 95 does not support group profiles, only individual profiles. And not all Desktop items are saved in a Windows 95 profile. Most of the other aspects of profiles that NT supports are supported for Windows 95 users.

Windows 95 expects the name of the profile file to be *User.dat*; a mandatory profile is *User.man*, and the change transaction log file is named *User.da0*. The Windows 95 computer must use a password when logging on to obtain a profile, and must be using the Client for Microsoft Windows to be able to use roaming profiles.

Windows NT 3.5x uses a different naming convention for profiles and doesn't support the NT 4.0 folder structure. Therefore Microsoft designed NT 4.0 to upgrade any NT 3.5x profiles when NT is upgraded to 4.0. Under NT 3.5x, profiles are named by user name or group and have a *.usr* extension, or *.man* if mandatory. The NT 4.0 upgrade

process leaves the original profile intact, and creates a second one with a *.pds* extension. If a user logs on from an NT 3.5x computer, it uses the *.usr* file. If the user logs on from an NT 4.0 computer the *.pds* profile is used. That way the 3.5x syntax is used for both versions of logon, but the two versions have profiles tailored to their needs.

Similarly if NT 4.0 finds an NT 3.5x mandatory profile, it converts it to a *.pdm* file. An administrator can create a *.pdm* file by creating a regular NT 4.0 profile first and then copying it to the NT 3.5x profile path and renaming it with the *.pdm* extension.

I generally find that profiles are used in one of three scenarios. If you always use the same machine and don't want to be bothered maintaining profiles, do nothing and you'll be using local profiles. This is the most common scenario.

The second scenario is where you are setting up a system to be used by many users and you want to limit the users to simple application usage. A mandatory profile lets you set up a profile that can

be assigned to many and is safe from being altered. It lets you define an environment that everyone will get, and not worry about someone destroying it.

The last scenario is where users move from workstation to workstation but need their specific desktop settings. This is the standard roaming profile setup.

In your own enterprises you may need to use all of these profile types. I hope you now understand more about the potential of profiles and can apply them to your own systems. ■

Bob Combs is the Director of Systems Architecture at PCSI in Englewood, New Jersey, a company specializing in client-server technology. He is a Microsoft Certified Systems Engineer (MCSE) and holds a master's degree in electrical engineering.

AS I HAD MENTIONED in the last column, I am receiving more and more junk e-mail. I suppose it wouldn't matter that much if I had a fast connection between my system and my ISP. But I don't. I am connected at 33.6 kb and I don't like any of that minimal bandwidth wasted on superfluous noise. I am using *zfilter* (described in the previous issue of *hp-ux/usr* magazine) on a regular basis now. While this program will prevent e-mail from arriving in my inbox, it does not stop the e-mail from entering my system. See my discussion of *exim* below for that solution.

In the meantime, I am slowly enhancing *zfilter*'s filter rule file in order to define e-mail that is junk. If you are using *zfilter* (or even some other filtering program) and have identified sites that originate junk mail, why not share it with the readers of this magazine.

May we all have a clean inbox.

On another note, I received an e-mail message from Brian Coogan in Australia (brianc@cna.com.au). He wanted to know why he should use the *tcp_wrapper* package I had mentioned some months ago when he could simply use the filtering capabilities in *inetd* itself via the *inetd.sec* file. The first thing that came to my mind was, What *inetd.sec* file? I had never heard of such a thing. But indeed, Brian was right. By doing a *man inetd.sec*, you will see that HP does supply functionality similar to *tcp_wrapper*. This is an HP-UX extension that I had never heard of before. It does not exist on IBM's AIX or on Sun's Solaris. Thanks for sharing your information, Brian.

GNU.ANNOUNCE

gnusql (v 0.7b5)

Here is an interesting new GNU soft-

ware package, an SQL server. This program is currently in beta testing. If you are interested in such a tool and if particularly you would be willing to contribute to the development effort (by testing the software), then take a look at what has been done.

Developed by a small team of people from the Institute of System Programming, Russian Academy of Science, the SQL server sources can be downloaded via ftp from [alpha.gnu.ai.mit.edu](ftp://alpha.gnu.ai.mit.edu) as file `/gnu/gnusql-0.7b5.tar.gz`. In addition, you can browse the development Web site at <http://www.ispras.ru/~gsql>. Although the current version of the software is 0.7 beta 5, I notice that new versions have been released over the past few months. Be prepared to download a newer version.

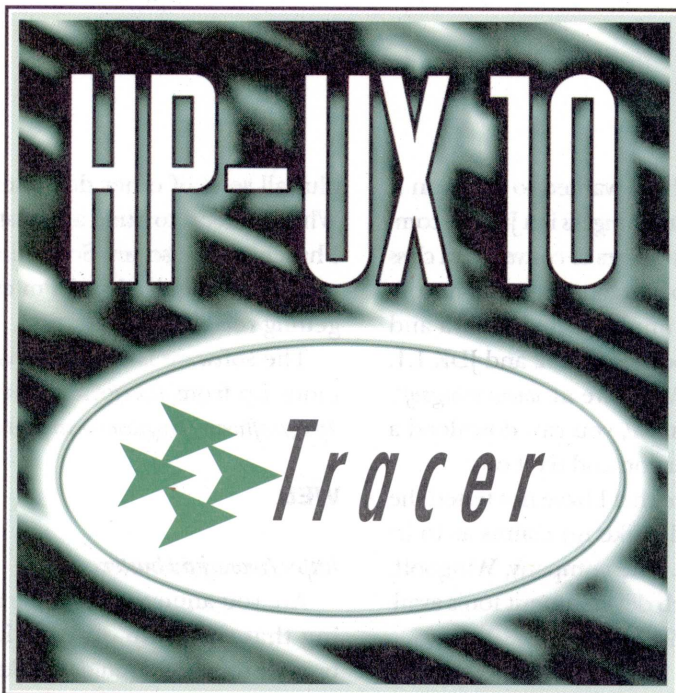
ALT.SOURCES.D

cs (v 0.3)

More beta software, but this one will be nice when completed. Those of you who have used SVR3 and SVR4 flavors of UNIX will recognize a development tool called *cscope*. *cscope* creates an index of a C source directory (including headers) and allows a user to read through the sources quickly. It really comes in handy when you're looking for obtuse variables with names such as 'n', which would ordinarily trigger every other word when using a text processor.

Michael Haardt (michael@cantor.informatik.rwth-aachen.de) has just released Version 0.3 of *cs*, a program with the same "touch and feel" output as *cscope*. Currently the program works only for projects where the number of source lines is less than 100,000.

The author claims that *cs* should work on any system that supports POSIX, ANSI C, and the SYSV curses library. It



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has been a while since I have used curses (a text-oriented screen display library); I do not know whether HP-UX uses the SYSV curses library. I think not as I had some problems building the software. One solution is to download a package called *ncurses*, which should supply all the needed functionality that *cs* requires. The other solution is to do a bit of hacking.

Speaking of hacking, module *main.c* uses two curses variables that are not defined on HP-UX systems: *KEY_BEG* and *KEY_END*. I redefined *KEY_BEG* to be *KEY_HOME* and commented out *KEY_END*. Everything compiled and linked fine (after I included a "lcurses" in my link). I ended up with one unsatisfied reference to procedure *curs_set()*, whose function I frankly didn't remember. As a quick fix, I created a dummy no-op version of the function. Everything executed fine but there were some funny keyboard responses and weird display

problems when using the package.

I wasn't deterred because I liked the program. I subsequently downloaded and installed *ncurses* (see below). I rebuilt *cs* using the *ncurses* includes and library. Now the program really looked like the *cscope* that I remember. A really nice tool, *cs* is available via ftp from *can-tor.informatik.rwth-aachen.de* as */pub/unix/cs-0.3.tar.gz*.

Cfengine (v 1.4.0)

Cfengine is a system administration tool that combines a very high level language with an expert system. Network-wide services can be configured from a single centralized site. Included are the following features: Network file copying (*rdist* functionality), remote execution of *cfengine* with anti-spamming controls, file system copying while preserving hardlinks, and extensive time classes that provide

a netwide front end to *cron*.

The author, Mark Burgess, maintains the software at the following site in Norway: <http://www.iu.hioslo.no/~mark/cfengine>. This site includes the source code as well as an extensive online manual.

COMP.UNIX.AIX

squid (v 1.1.11)

As the *squid* FAQ describes it, "*squid* is a high-performance proxy caching server for Web clients, supporting FTP, gopher, and HTTP data objects. Unlike traditional caching software, *squid* handles all requests in a single, non-blocking, I/O-driven process. *squid* keeps meta data and especially hot objects cached in RAM, caches DNS lookups, supports non-blocking DNS lookups, and implements negative caching of failed requests. *squid* supports SSL, extensive access controls, and full

request logging. By using the lightweight Internet Cache Protocol, *squid* caches can be arranged in a hierarchy or mesh for additional bandwidth savings.

"Squid consists of a main server program, *squid*, a Domain Name System lookup program, *dnsserver*, a program for retrieving FTP data, *ftpget*, and some management and client tools. When *squid* starts up, it spawns a configurable number of *dnsserver* processes, each of which can perform a single, blocking Domain Name System (DNS) lookup. This reduces the amount of time the cache waits for DNS lookups."

squid is derived from the ARPA-funded Harvest project and works on all major UNIX platforms, including HP-UX. The software is available at <http://squid.nlanr.net/Squid/>.

MISC

ncurses (v 1.9.9g)

Most sites that act as repositories for *ncurses* have Version 1.8.6. I went to the main source for the software (ftp.netcom.com) and found a newer version. The source can be found in directory `/pub/zm/zmbenhal/ncurses` as *ncurses-1.9.9g.tar.gz*. Compiling and building *ncurses* on my HP-UX 10.01 system was straightforward. Use this package if you have any curses applications (such as *cs*, above) that you want to run. Not only does this library support SVR4 curses, it includes color support and other enhancements, too.

WingDis (v 2.06)

While I'm not overly keen on disseminating information about software that needs to be purchased, this product is cheap enough (\$29.95) and, seems use-

ful enough that I wanted to mention it in this column. *WingDis* is a Java decompiler that allows users to convert Java class files back into Java source code. The software itself is implemented in Java and can run on both JDK 1.02 and JDK 1.1. From their Web site at www.wingsoft.com/wingdis.shtml, you can download a free demo version and try it out.

Please note that I have not tested the software and make no claims as to its functionality. The company, WingSoft, has other Web development tools available for \$29.95 or less.

exim (v 1.62)

As you can tell, I've become really angered by the proliferation of junk mail. The real solution to junk e-mail is not to filter it out of your inbox but rather, not to allow it into your system at all. And until my friend Harlan Stenn had made me aware of the existence of *exim*, I didn't think that such software existed.

As the *exim* overview document states, "Exim is a mail transport agent (MTA) developed at the University of Cambridge for use on UNIX systems connected to the Internet. It is freely available under the terms of the GNU General Public License. In style it is similar to *Smail* 3, but its facilities are more extensive, and in particular it has some defenses against mail bombs and unsolicited junk mail, in the form of options for refusing messages from particular hosts, networks, or senders. *Exim* is in production use on a number of sites that move tens of thousands of messages per day."

In short, *exim* is a replacement for sendmail. It has the added functionality of being able to filter out traffic from certain machines (junk mail computers!) and loads of other goodies. The package comes with a 175-page manual

plus all sorts of other documentation. While I intend to build and install *exim*, I haven't done so yet. Some time commitment is required and I'm currently getting ready for my vacation.

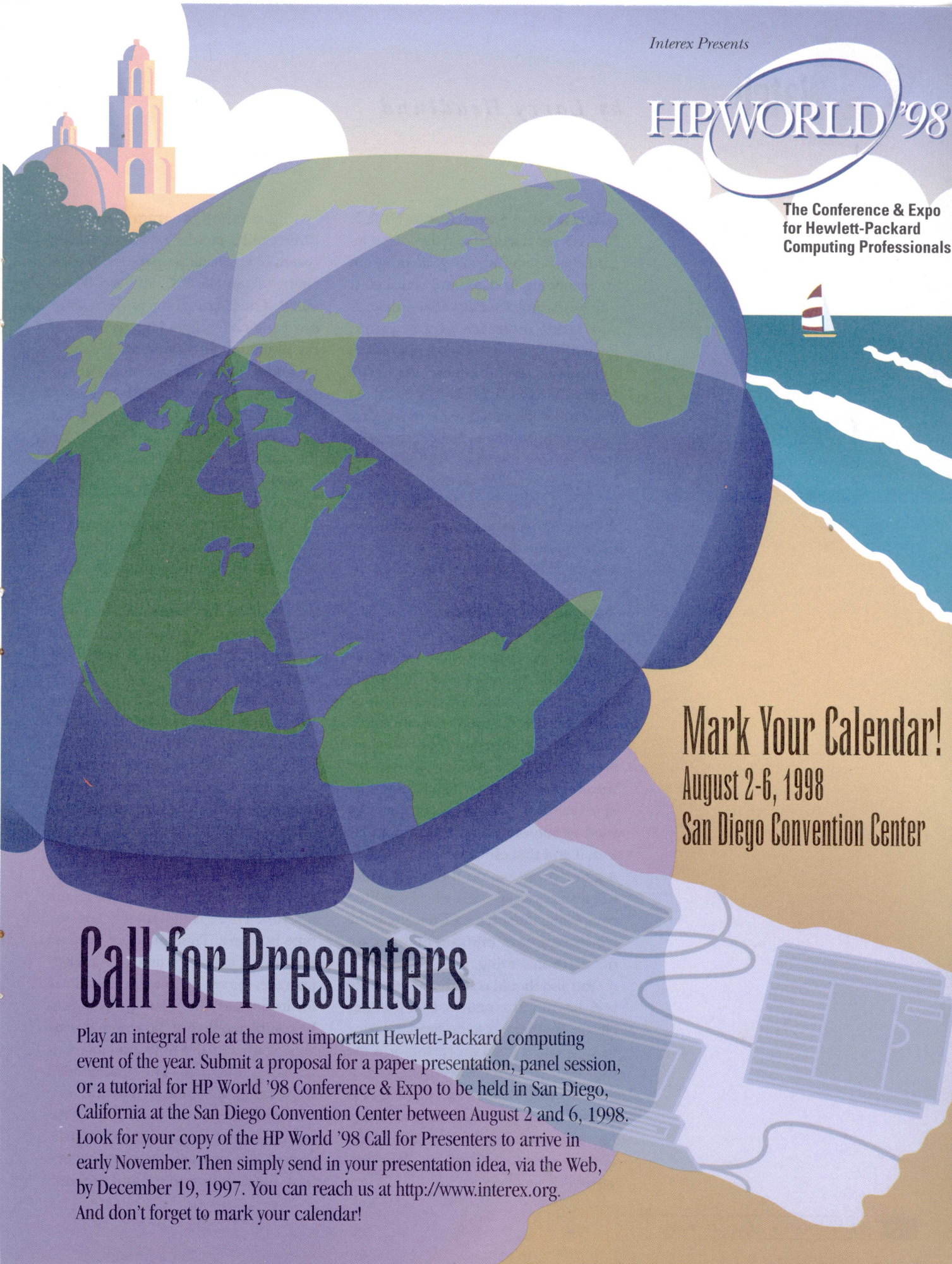
The software is available via anonymous ftp from <ftp.cus.cam.ac.uk> in the `/pub/software/programs/exim` directory.

WEB

<http://www.junkbuster.com>

Are you annoyed by all the advertising that shows up on your Internet browser software? Would you like to minimize if not completely eliminate any user identifying information that your browser sends to an Internet server? Visit this site, download their software, *JunkBuster* (Version 1.4). ■

Joseph Berry is a senior software developer at Landmark Systems Corporation in Vienna, Virginia. He is one of the authors of Landmark's PerformanceWorks products, PerformanceWorks/Smart Agents for UNIX. A former HP 3000 systems specialist for Hewlett-Packard, he has been in the computer industry for more than 25 years. He can be reached at joe@wayne.unix.landmark.com.

The background of the poster features a large, stylized globe in shades of green and blue, tilted at an angle. In the upper left corner, there is a colorful illustration of a cathedral with multiple towers and domes. In the upper right, a sailboat with a red and white striped sail is on a blue sea. The bottom of the poster shows faint, overlapping images of computer hardware, including a monitor, keyboard, and mouse, along with some abstract shapes.

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Critical Task

WITH THE TRANSITION to HP-UX 10.x, HP has discontinued the long standard character only */etc/update* program for managing updates and replaced it with */usr/sbin/swinstall*, a tool with an X and Motif interface as an option. Recently I spent a weekend upgrading a couple of machines at a client's site from HP-UX 9.01 to HP-UX 10.20. As you can imagine, the experience gave me an opportunity to look at the *swinstall* interface for an extended period. I started to examine the interface from the perspective of the designer, noting the conventions employed, the tools used, and the decisions made. I looked at it critically to see what I could learn.

Purpose and Audience

Whenever you start to criticize any product, the first questions to ask is, What does it do and who uses it? A product that is used almost continuously or every day has different requirements than one that is used only occasionally. For example, if a product is used for "heads down" order entry, the developer knows that product will usually be used by someone who is very familiar with it and that efficiency is important. A game program, on the other hand, will attract casual users who have little compelling interest in efficiency and the consequences of mistakes in input are not earth-shattering.

You also should consider whether the user has any alternatives. Can the user choose another tool to perform the same task, as with a word processor, or is the user your prisoner, where your tool is the only one for the task? If the user is constrained, you must have a tender regard for usability, for that user has no options, no escape from your decisions. *swinstall* is such a program.

The *swinstall* program is used for three similar tasks. First are operating system or application upgrades, like the change from HP-UX 10.0x to HP-UX 10.20. These are major undertakings involving changing a large portion of the operating environment. Second is the adding of functionality to an existing system, such as adding the Developers' Environment or upgrading the number of users permitted by the OS. Third is the management of patches, those point repairs or enhancements to particular features of the OS.

The typical user of *swinstall*, since it is used for upgrading the operating system, is most definitely not naive. The users are system administrators with all the expertise that implies. They can be expected to have a knowledge of and interest in the details far beyond the average user.

The typical user will not be using *swinstall* regularly. The system administrator will use it roughly annually for releases and, if conscientious or in need of a particular patch, a little more frequently, when patches are sent around on tape or CD-ROM or when they are downloaded through the Internet.

The typical user is not in a good mood. Operating system upgrades are not fun. There is the anxiety and the time pressure. Time pressure because sometimes, almost certainly for a major upgrade, the system must be unavailable for its primary use. The upgrade must be completed before the system is available again and the time available may be barely adequate. The time needed for the upgrade must include the time consumed by a system backup, two if the administrator is cautious or battle-scarred. The time allocated must include time for a restore to the old system if

things don't go well. These time constraints mean the upgrade is usually done on weekends when the administrator would rather be doing something else. The anxiety comes from the possibility of failure—catastrophic failure from the small but not impossible chance that the new system won't boot or that serious problems when in-house or third-party programs fail when interacting with the operating system changes.

The typical user, harried and anxious with the tasks at hand, not completely comfortable with the interface since it is not used every day, expects the *swinstall* program to make life easier, not harder. There will be little patience with quirks of the interface that work against the task, not for it. A tough customer!

The Look of *swinstall*

swinstall looks like your usual Motif application. Pull down menus, pop up dialogues, list widgets to select from, and all. It does have some of its own conventions it uses consistently. These conventions, which are not constrained by standards, which are chosen freely, are the most interesting to examine.

swinstall will present information that cannot be changed by the user as part of a Label widget rather than as a Text widget set insensitive. For example, the message telling the user how far along the program is will be "Processed 20 of 25 packages" in a Label and the whole message will be rewritten as the processing proceeds. This has a few consequences. The whole message, both the permanent part and the changeable (or secular) part, is in a single font. Hence what is changing is not distinguished in the design itself. Any internationalization has to be taken care of internally in the program, presumably through a message catalogue.

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CIRCLE 4 ON READER SERVICE CARD

Also, real labels, attached to input fields, are not distinguished typographically from messages. On the plus side, it probably makes internal geometry management simpler when Label and Text widgets are usually not interspersed on a single line.

Another convention which *swinstall* uses is a means of indicating the application is busy processing. The usual X/Motif way to do this is by changing the cursor to an hourglass or clock and making the appropriate controls insensitive. *swinstall* makes widgets insensitive but instead of the cursor change it has a label field that switches between a slash (/) and a minus sign (-). This is the same convention that appears in SAM and probably for the same reason: portability between X and character interfaces. The cursor change makes sense in an X context, where you have a choice of cursor types and a distinct cursor to represent mouse position, but how about a

character interface? There you don't even have a standard way to control the cursor type and the type (blinking, solid line, bold, dim, block) is usually under the terminal's local control. Nor do you have the concept of mouse position as distinct from cursor position in a text field. This convention, of alternating /- to indicate busy, is the same one that is used in the SAM interface and I suspect it comes through the use of the JAM interface builder from JYACC.

List Display

Updating is usually not an all or nothing affair. You don't have to update or add everything from a media source (tape, CD-ROM, or patch file). Indeed, sometimes you can't access everything without special passwords. The password system enables HP to distribute a single set of media to all subscribers while retaining some functionality (developer's envi-

ronment, enhanced multiuser license, ALLBASE DBMS, etc.) for customers who will pay for them. Other sites may not want even all of the included software. For example, a smaller 800 machine with only character terminals would not want to expend disk space on the X Window environment it cannot use. Hence the distinct components on the media appear as items on a list the user can mark for installation or not. The *swinstall* program allows the user to look at the detail of an item. This detail may be a similarly configured list of items, each of which can be marked individually for inclusion or exclusion. Information about an individual line item can be accessed and displayed at both levels.

With HP-UX 10.0 HP introduced two new ways of organizing its software. It now classes its software in products, bundles, and packages. You can choose from the View menu how you want the items to be presented. These are your only options in displaying the items. In particular, you have no control over how the items are sorted inside the list. This can create a problem, particularly in loading patches.

Patches, when they are distributed on CD-ROM, take the form of files. Inside the directory tree are branches for platform, 700 or 800, and release, i.e., 10.0, 10.20. At the final level are one or more files, labeled as hardware patches, critical patches, and other. You point *swinstall* at one of these files and begin. The individual patches within the file are labeled with a patch identification, but the list is not sorted by the identification. There can be a large number of patches in any particular file.

There can be problems with loading any set of patches. The process of loading patches includes an analysis phase in

which each patch is analyzed for errors and warnings. These warnings can range from the patch already being implemented on your system to show stoppers like not enough disk space. The problem is that this analysis takes considerable time. The messages are sent to a log file which can be displayed; however, the individual patches are not always analyzed or loaded in the order they appear. So the order of messages is not the same as the order in which items are displayed.

Suppose you have a patch file to install. You use the option, as recommended, "Select What Target Has." After running through a lot of the items, almost all of which the analysis reveals are already installed, a serious error, say insufficient disk space, occurs and processing aborts. Now, the analysis has taken considerable time. After finding more disk space you would like to speed up the procedure by telling the *swinstall* program not to install all those items which are already installed. But this is difficult. Going from the log with the ID of patches you don't want to install to find them on the list is tedious, unnecessarily tedious. If you could put the list in the order of the patch ID it would be simple, but you can't.

Actions

The program *swinstall* has a single pull-down Actions menu. On that menu are buttons for actions that apply to the whole, such as "Match What Target Has" or "Begin Analysis," as well as actions that apply only to items selected, such as "Mark for Install" or "Unmark for Install." When no items are selected, the item-specific buttons are set insensitive. This is a common way to do things, but it isn't the way I would do it.

I would set up two action menus, one for global actions, one for actions on

selected items. One reason is for encapsulation. When there are items selected, the individual buttons must be set sensitive if the common architecture is used. That means that some routine must know which buttons are which. If the buttons are grouped under global actions or item actions, only the ID of the item actions menu must be known to that callback, not each individual button. Information hiding is a good thing. You can of course accomplish the same encapsulation by having one function call that sets the buttons sensitive and another that sets the same group insensitive, but I find the separate menus approach cleaner.

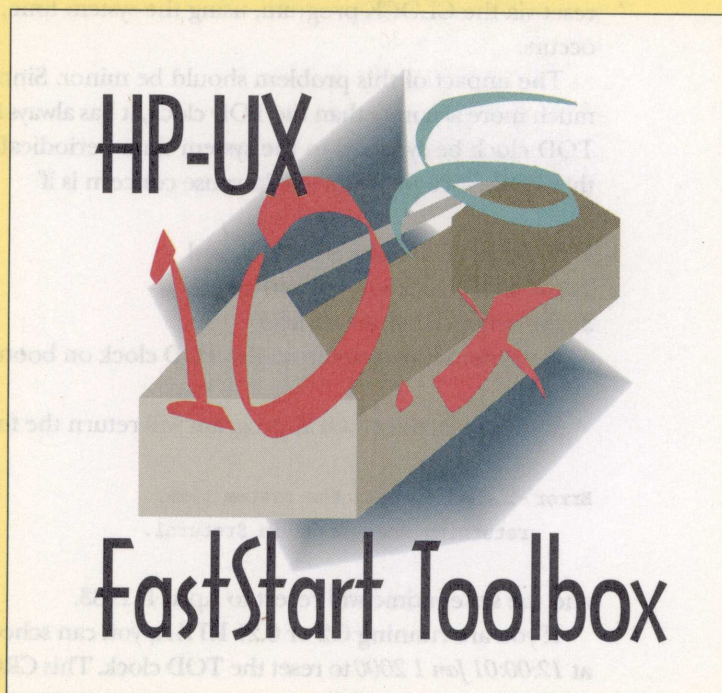
More important from a user perspective, having all the buttons on one menu introduces a possibility for error. I made one of these errors while using the interface. I meant to activate "Mark for Install" on an item but slipped and activated the "Begin Installation" button on the same menu. Now no permanent action on the target system was taken, but the entire analysis process, which took the better part of an hour, had to finish (it cannot be interrupted) before I could proceed with the task at hand. Since it was already late at night, the time these sorts of mishaps are most likely to happen, I was not a happy camper.

Conclusion

I like the new interface for updates. It is superior in capabilities and usability to the old update program. But there are some things I would do differently if it was mine to change. ■

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Q: I have done some testing of the A990 Time of Day clock and it appears to have a problem rolling to the year 2000. Is this a real problem?

A: A problem has been discovered in the A990 Processor Time-Of-Day (TOD) clock. At midnight on Dec 31, 1999, the TOD clock does not roll over to the year 2000 correctly. After midnight on Dec 31, 1999, the TOD will report:

Aug Jan 18, 1902 33:22:28 am

If the TOD clock is subsequently set to a valid date in the year 2000, then everything works normally. At least until the year 3000.

So the simple workaround for this problem is to make sure the TOD clock is reset via the CLOCK program, using the system time, after the year 2000 rollover occurs.

The impact of this problem should be minor. Since the system clock (TBG) is much more accurate than the TOD clock, it has always been recommended that the TOD clock be synched to the system time periodically. The only scenario where this TOD clock problem would cause concern is if

1. the year 2000 rollover occurs, and
2. the TOD clock is not reset, and
3. the system is rebooted, and
4. the system time is set from the TOD clock on bootup.

In this case, the CLOCK program will return the following error:

```
Error -1 when setting the system time;  
returning that value in $return1.
```

and the system time will revert to April 1, 1983.

If you are running 6.2 or 6.21 RTE-A, you can schedule a CRON job to execute at 12:00:01 Jan 1 2000 to reset the TOD clock. This CRON job would simply run the CLOCK program as follows:

```
CLOCK A9 set
```

If you are using 6.1 or earlier, you can time schedule the following program nightly at 12:01 am to reset the TOD from the system time. This is recommended, and will eliminate the problem.

```
ftn7x,1,s  
    program settod(3,99),  
c    This program simply schedules "CLOCK" to set the A990  
c    Time-Of-Day clock from the system time. This program is
```




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```

c   time scheduled to run every midnite to sync the two.
c
c   The TBG is more accurate than the TOD, thus we reset the TOD
c   every night.
c
c       implicit integer (a-z)
c       integer*2 error,param(5)
c
c       ERROR=FmpRunProgram('XQ,clock,a990,set',param,clock)
c       if (error.ne.0) then
c         write(1,*) ' Error scheduling CLOCK ', 'Error is ',error
c         stop
c       endif
c       end

```

Then time schedule SETTOD as follows:

(This should be done from the welcome file at bootup)

```
CI> AT 12:1:1:01 am 24 h settod
```

SR 5003373456 has been submitted for this problem. A hardware fix is not anticipated, since the problem has an easy workaround.

Q: Is it possible to back up and restore an RTE-A system via LAN?

A: This question has been asked many times, and though it has never been a "supported" backup strategy, it is feasible. It is also much more practical now thanks to the performance increases of NS/1000.

These performance increases greatly speed up transferring files between systems. So let's dive right in. The fundamental pieces required are:

1. A full function memory-based system that includes NS/1000 and backup utilities. Memory-based NS/1000 was supported as of the 5.2 release.
2. A host from which the RTE-A system can be booted.
3. A backup archive that contains everything necessary to rebuild the system.
4. Ideally, a command file to automate the entire process.

The examples I will provide here are meant as an outline of the steps required. Obviously, every system is different and yours may require changes to what you see here. The concept remains the same.

The key to the whole idea is having a memory-based system that includes NS/1000 and has all the utilities (FST, FPUT, CI, etc.) needed to install a system onto an empty disk. So let's start there.

Running NS in a memory-based system requires that the system file include RAM disk. If your system does not currently have any RAM disk LUs generated in, you will need to do this. Refer to the SGI for details. At a minimum, two RAM disk LUs are needed.

It is not necessary that your normal disk system have RAM disk, but the system/snap file for the memory-based system must.

Listing 1 shows a BUILD command file for the memory-based system. This system requires 3072 pages (6144 Kbytes) of memory.

As you can see, key programs are RP'ed into memory, as in any typical memory-based system, since these programs should never be removed. All other programs are placed into RAM disk, and are RP'ed as needed just as in a disk-based system. Additionally, other files are also placed in RAM disk, particularly /SYSTEM, /ETC, /CATALOGS, and /USERS. /USERS is optional. But without it, you cannot TELNET or FTP into the memory-based system. I have included it here to illustrate how to build a fully functional NS memory-based system.

A comment about the /M_USERS directory: There is no reason why one could not use the existing /USERS directory. I decided to create a new /USERS directory, called /M_USERS, and then use a modified GRUMP, which acts on this directory. Why I did this I am not quite sure. But it works.

In our disk-based system, LU 12 is the boot LU and contains all critical directories: /PROGRAMS, /SYSTEM, /CATALOGS, etc. This LU is backed up to an FST archive and then this archive is copied to another system using FTP. This is the *only* backup. Make certain that a copy of the current Boot

LISTING 1 BUILD command file

	Comments
!memsys::system::-192	Output file name
answer.snp	Snap file
answer.sys	System file
yes	Automatic partitioning
3072	Size in pages
rp./programs/drtr.run,d.rtr	Required programs.
rp./programs/derr.run,d.err	
rp./programs/ci.run,cm	
rp./programs/ci.run,start	
st,,2	Define START as startup program
rp./programs/nm2.run	
rp./programs/uplin.run	
rp./programs/inpro.run	
rp./programs/outpro.run	
rp./programs/inetd.run	
rp./programs/rpmmn.run	
rp./programs/nftmn.run	
rp./programs/promt.run	
rp./programs/logon.run	
/e	
2,mc	Mount RAM disk LU 2
/programs/io.run	Copy program files to
/programs/li.run	RAM disk
/programs/fput.run	
/programs/dl.run	
/programs/wh.run	
/programs/ci.run	
/programs/cix.run	
/programs/fst.run	
/programs/ftp.run	
/gen/ftpls.run	
/programs/ls.run	Copy of LS.RUN since we
/programs/nsinit.run	don't have symbolic links.
/programs/mmunit.run	
/programs/rdate.run	
/programs/systz.run	
/programs/tnsrv.run	
/programs/ftpsv.run	
/programs/hpmdm.run	
/programs/edit.run	
/e	
programs	Name of directory on RAM disk
/catalogs/>fs000	More files to copy
/catalogs/inetd.c000	
/e	
catalogs	Name of directory on RAM disk
/gen/welcome2.cmd	More system files
/gen/nsfile.nsin	
/system/nsinit.msg	
/system/nserrs.msg	
/gen/"mess.txt	
/gen/restore.cmd	
/gen/ftpcmd.cmd	
/gen/fstcmd.cmd	
/e	
system	Name of directory on RAM disk
/etc/inetd.conf	More system files
/etc/services	
/etc/hosts	
/e	
etc	Name of directory on RAM disk
/m_users/logonprompt	User files
/m_users/ftp	
/m_users/manager	
/m_users/nogroup.grp	
/m_users/masteraccount	
/m_users/mastergroup	
/m_users/system.grp	
/m_users/jackg	
/m_users/walt	
/m_users/marc	
/e	
users	Name of directory on RAM disk
/e	
/e	

LISTING 2 WELCOME file

	COMMENTS
* WELCOME2.CMD REV.6.2 for Brutus	
*	
set log = on	
*	
*	
cn,3,25b,200	Initialize and mount auxi-
lary	
in,3,,ok	RAM disk LU 3 for /SCRATCH
crdir /scratch 3	
prot /scratch rw/rw/rw	
*	
*	
wd /programs	
*	
*	
nsinit nsfile.nsin::system	Initialize NS
*	
hpmadm 79 ad	Add TELNET LUS
hpmadm 80 ad	
hpmadm 82 ad	
*	
*	
systz -s +8	Optional: Set time via
rdate mamba	HP9000 (6.2 only)
*	
co "mess.txt::system 1	
*	
*	
set log = off	

Extension (BOOTEX) file is included; I keep mine in the /SYSTEM directory.

I use this other disk-based system as both the boot source and the backup location for the FST archive. This system must be RTE-A if you plan to boot from it (Booting RTE-A from a 9000 is not supported). If you have no other 1000 on the network, then you will need an alternate medium from which to boot the memory-based system.

Listings 2 and 3 show the Welcome and NSINIT answer file used by the memory-based system. You will note that since all required NS programs were RPed in the build, nothing else needs to be RPed prior to running NSINIT.

The procedure used to recover the system using the memory-based system is documented in Listing 4, which is a command file used to perform all the steps. This command file exists in the SYSTEM directory of the memory-based system.

Listings 5 and 6 show the command files used to copy the archive file and then restore the backup using FST. ■

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LISTING 3 *NSINIT answer file*

```
* DEFAULT.NSIN 91790-17088 REV.6200 <970625.1407>
* SOURCE : 91790-17088
* NSINIT Answer File
*
* This is an NSINIT answer file to initialize NS-ARPA/1000 with a default
* configuration. The configuration is a simple case for a node on a LAN with
* no gateway. It does not include DS/1000-IV services.
*
* DO NOT EDIT THIS FILE TO ADD DS/1000-IV SERVICES, AS MORE INFORMATION IS
* REQUIRED.
*
* This file is used by NSSTART_EZ.CMD.
*
* _____
* NSINIT file: DEFAULT.NSIN 4:05 PM FRI., 6 MAY, 1994. *
* Network Initialization Options:
* 1: Build Output File.
* 2: Build Output File & Initialize Network.
* 3: Initialize Network.
* 4: Shut Down Network Subsystem.
* Enter an option number [(1)..4]:
3 * Initialize Network *
* Enter the local node name. Format: name.domain.organization
* (Each field may be 1..16 char).
* Local Name:
BRUTUS.HP.COM
*** Classes of Events to log ***
* 6: Resource limit exceeded
* 5: Disaster (irrecoverable error)
* 4: Error (severe, but recoverable error)
* 3: Warning (unexpected event)
* 2: Event message
* 1: Internal State Information
*
* Enter the event classes to log, one per line.
* [/D = 4, 5, and 6]. Type /E to end.
* Event class:
/E
* Enter an event log file name [default = /system/ns_event.log]:
* No EVENT logging since we said /E above.
* Do you want to start NSTRC when NS is enabled [Y/(N)]?
/D
* Do you want Network File Transfer (NFT) [(Y)/(N)]?
N
*** Network File Transfer (NFT) ***
* Default Buffer Size: 2048 Bytes
* Transport Checksum Used: No
*
* Do you want to modify these values [Y/(N)]?
*/D
*** DS/1000-IV Compatible Services ***
*
* Do you want any DS/1000-IV compatible services [Y/(N)]?
/D
*** NS Nodal Information ***
*
* Defaults are derived from previous responses.
* Maximum number of active NS programs is: 24
* Maximum number of active NS sockets is: 77
*
* Do you want to modify these values [Y/(N)]?
/D
*** Nodal Registry ***
*
* Maximum number of Connect-Site path reports is: 101
* (The above value is derived from previous responses.)
* Maximum number of Nodal path reports is: 20
*
* Do you want to modify these values [Y/(N)]?
```

Continued

LISTING 3 *NSINIT answer file, continued*

```
/D
* Enter the maximum number of name records (the default is derived
* from previous responses) [1..(50)..303]:
/D
*** Transmission Control Protocol (TCP) ***
*
* Initial Segment Size in bytes: 4096
* Retransmission Backoff Algorithm: Exponential
* Retransmission Smoothing parameter Alpha: 9
* Retransmission Smoothing parameter Beta: 20
* Do you want to modify these values? [Y/(N)]:
/D
*** DCN ***
* Enter information on this node for each Directly Connected Network.
* Format:
*
* <local IP addr>, <[subnet mask]>, RTR, <segsize: [1200..(8000)]>
* <local IP addr>, <[subnet mask]>, 802/LAN/ETHERNET,
* <segsize:[1200..(1514)]>, <link LU>, (E)/NE, <[station addr]>
*
* Where E = Enable, NE = do Not Enable. Type /E to end.
*
* *DCN:
15.37.241.7,,LAN,,96
* *DCN:
/E
** Internal Use Only **
/e
*** GT ***
* Enter information for each Gateway (GT).
* Format:
*
* <Dest IP Net>, <Gateway IP>, <Hops: [1..(100)]>
*
* Where: Dest IP Net = IP Address of any node on a remote net
* Gateway IP = DCN IP Address of Gateway to use
* Hops = Maximum allowed IP hops to Dest IP Net
* Type /E to end.
*
* *GT:
/E
* Enter the maximum number of Path Records for IP. The default is derived
* from previous responses [6..(103)..200]:
/D
*** ADDRESS RESOLUTION ***
* Maximum number of active PCB Records: 10
* Retry interval timeout in centi-seconds: 100
* Proxy Nodal Registry Server: No
*
* Do you want to modify these values [Y/(N)]:
/D
*
* Default IEEE-802 Multicast Addresses for Probe:
* Target Address: 09-00-09-00-00-01
* Proxy Address: 09-00-09-00-00-02
*
* Do you want to modify these values [Y/(N)]?
/D
* Enter the Network security code for this node [1..2 char]:
NS
* Enter the Network User's security code for this node [1..2 char]:
NS
*** EMA Usage ***
* 3 pages available 1 pages used
*** System resources required for this file ***
* DSAM Table size in words: 32146
* Number of RTE Class Numbers: 4
* Number of RTE Resource Numbers: 4
* SMB size in words: 0
* NSINIT successfully completed action BUILD.
```


LISTING 4 *Command file to restore*

```
*
* Command file to restore BRUTUS from an FST archive
* kept on REMUS
*
* Procedure is as follows:
*
* 1) Boot BRUTUS via LAN from REMUS
*    %BDS37
*
*    This brings up a NS Memory-Based system
*
* 2) This command file will perform the following steps:
*
*    a) Rename existing Ram Disk directories so that the disk based
*        directories on LU 12 can be restored with FST
*
*    b) Initialize LU 12
*
*    c) Create directory structure on LU 12
*
*    d) FTP the FST archive, /BRUTUS/ARCHIVE.FST from REMUS
*
*    e) Restore FST backup
*
*    f) FPUT bootex to LU 12
*
* 3) If things go wrong, you simply reboot the memory based system,
*    and start over.
*
* We set the WD to /PROGRAMS, so that we can access programs
* after we change the directory name.
*
* wd /programs
*
* Rename directories that we will be restoring from the FST backup.
* Since these are in RAM, we do not need to change them back, we
* can simply reboot the memory based system.
*
* rn /programs /p
* rn /system /s
* rn /etc /e
* rn /users /u
* rn /scratch /sc
*
* We next initialize the LU we will be restoring, create a
* /SCRATCH directory to hold the FST archive. Then create
* necessary directories based on the backup. This step is not
* required, since FST will generally put files back where they
* came from, but it does avoid confusion.
*
* in,12,768,ok
*
* mkdir /scratch 12
* prot /scratch rw/rw/rw/
*
* mkdir /programs 12
* mkdir /system 12
* mkdir /users 12
* mkdir /m_users 12
*
* Next we FTP the FST archive over from the system it is stored
* on. In this example, we have command files in the /S (renamed
* from /SYSTEM) directory of the memory based system.
*
* ftp -l/scratch/ftp.log -t/s/ftpcmd.cmd
*
```

LISTING 4 *Command file to restore, continued*

```
*
* Now we run FST and restore the files.
*
* Echo ``
* Echo `Restoring system files`
* Echo ``
*
* fst tr /s/fstcmd.cmd
*
* Echo ``
* echo `Installing Bootex`
* Echo ``
*
* Re-install Bootex. If you have a FMGR boot LU, this would be
* done with a FMGR DU command.
*
* fput /system/bootex 12 0
*
* Echo ``
* Echo `Finished`
* Echo ``
* Echo `Ready to Reboot system from disk`
* Echo `Hit Break, and type %BDC6027`
* Echo ``
* Echo ``
*
```

LISTING 5 *FST Archive file*

```
*
* Command file used to get an FST archive file from a
* remote system
*
* Run string: ftp -l/scratch/ftp.log -t/s/ftpcmd.cmd
* as shown in RESTORE.CMD
*
* open 15.37.241.3
* user walt ***password
* get /brutus/archive.fst /scratch/archive.fst
* exit
```

LISTING 6 *Restore from Archive file*

```
* Command file to restore from an archive file
*
* Run string: fst,tr,/s/fstcmd.cmd
* as shown in RESTORE.CMD
*
* mt /scratch/archive.fst
* re @
* go
*
```




CSL Perspective

IF YOU'VE BEEN FOLLOWING the many computer magazines for the last year, I'm sure you've seen the plethora of articles on the so-called "Year 2000 problem." Having been around the industry for some 25+ years, I think I understand pretty well what the issues are and some of the ways vendors and customers will work through them. In working with other customers and peers in the industry, I'm still developing an appreciation for the immensity of the task at some companies. In the world of publicly available software, we have some additional challenges that I would like to discuss. First, let me briefly describe the major areas of concern, and the process that will be used.

HP has helped users by proactively addressing the many aspects of Y2K including hardware, software, and application interfaces. For a thorough discussion of HP's strategy for dealing with Year 2000, including a discussion of the technical issues, please refer to the excellent Year 2000 home page found at Access HP <http://www.hp.com/go/year2000>. There you will find many resources including the White Paper "Year 2000 Issue: An HP Perspective." From the CSL perspective, we are primarily concerned with the C library programming interfaces and some system commands as well as the formatting of displayed date information, sorting, and date interpretation in computations. Although much of the focus is on application source code, we also need to look at any programs that contain shell scripting languages like ksh, sh, csh, and perl.

As the CSL committee began to look at the impact of Year 2000 on the library, we saw some unique challenges. Since Interex does not directly control the source code that makes up the pro-

grams, any changes that may be needed must come from the authors. We may assess what needs to be changed and even make some preliminary changes but ultimately the original authors would need to sanction those changes. In some cases, the original authors are no longer supporting their software, having either handed it over to others or simply stopped making enhancements.

There is also the question of whether a particular package is utilized by a significant number of users. It doesn't make too much sense to assess the impact and plan a change strategy if no one is using the software. Finally, since we're a volunteer organization, it will be extremely difficult to develop strategies and implement changes without some dedicated resources.

Given these constraints, we see the Interex response in terms of a multistep process.

Survey the current membership on the software they utilize, determining the level of criticality that each package has. Rank order these results to determine the highest priority packages for further analysis.

Assess the situation by conducting an inventory of software including source files, scripts, and objects. Analyze where date information occurs.

Communicate with the authors, presenting our assessment, and determine if any changes have already been planned or implemented. If changes are relatively minor, make recommended changes available to the authors for integration into the base source code.

If the author is no longer available, determine the resources required to implement the changes and attempt to enlist help from the membership.

Once changes have been made, resubmit the modified package to the library.

As you can see, there are some areas where we need your help.

First, you can get up to speed on the technical aspects of the Year 2000 problem. Visit the Web sites mentioned above, and learn about the different solutions that are available. Next, while you are looking at your own systems, don't forget to consider any CSL software you may be using, and let us know what software you have installed. If you have any programming experience, please consider helping us in assessing and implementing changes. As I stated earlier, the committee is a group of volunteers, so we rely on the help and goodwill of the members. If you have any suggestions on what I've outlined above or can offer further insight, please don't hesitate to contact me. ■

Paul Gerwitz is chairman of the Contributed Software Library committee and a technical consultant at Hewlett-Packard. He can be reached at 610-408-6526 or via e-mail at gerwitz@interex.org.

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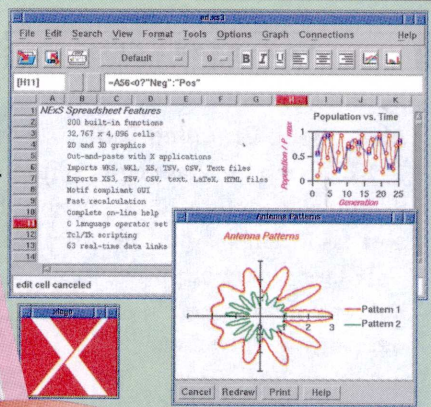
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Java-Based Graphing Tool

KL Group Inc. has begun shipping JClass Chart, enabling Java developers to embed sophisticated graphs and charts into applications and applets quickly and easily. The product includes JClass BWT collection of over 20 Java Beans.

JClass Chart supports many popular types of business and scientific charts, including line, 2D and 3D bar, 2D and 3D pie, stacked bar, and plot. Chart supports text format for static and dynamic labels, titles, and legends for full color and font control, as well as mixing images and URLs with text. Chart also supports a flexible data source which can access files, JDBC, sockets, JClass Live Table, and more. Interactive features of JClass Chart include rotation, translation, drill-down, zoom, editing, and scaling.

JClass Chart Bytecode is priced at \$399; JClass Chart Source is priced at \$999; and JClass Chart Gold Support is priced at \$300.

Contact KL Group, phone: (800) 663-4723 or (416) 594-1026, fax: (416) 594-1919, <http://www.klg.com>.



KL Group JClass Chart

Continued from Page 13

client-server product, which combines client-server processing with a single source of program maintenance on the server.

COBOL syntax can be integrated with the 4GL commands to provide unlimited capability while maintaining control and manageability of the programming environment. A comprehensive macro library (re-usable objects) facilitates the generation of hundreds of COBOL source lines with just one command.

The FlexGen environment provides for access to COBOL data through ODBC-compliant tools, satisfying EIS and DSS requirements, and provides an interface to RDBMS and COBOL file systems.

Contact EasiRun, phone: (800) 342-6265 or (937) 438-5553, fax: (937) 438-5377, <http://www.easirun.com>.

Desktop Network Computer

Affinity Systems has introduced Visara, a new line of network computers

designed to access any information, in any form, from any desktop in a business enterprise.

Scalable from a network-connected host terminal to an executive workstation, Visara provides the ability to run midrange, mainframe, Windows 95/NT, UNIX, and DOS applications; navigate the Internet; provide enterprise access in multihost environments; and run Java applications.

The network computer allows a user to simultaneously access multiple hosts. The Visara NC operating system includes true TN5250 and TN3270 emulation, and Java applications can be executed with the optional Java Virtual machine.

The NC allows a user to simultaneously access multiple hosts. The Visara network computer has no floppy drive. It can be expanded to support multimedia applications and video conferencing.

Pricing starts at \$698.

Contact Affinity Systems, phone:

(800) 432-1774 or (215) 412-0555, <http://www.affinitysys.com>.

CD-ROM Library

Luminex has announced that the 100-disk capacity Luminex LSX CDL 100 now ships with four 12X CD-ROM drives. The data transfer rate is 1.8 MB per second for each drive.

The Luminex LSX-CDL-100 Library is delivered as a complete CD-ROM networking solution. It includes a 100-disc, 4-reader library, an internal Luminex LSX SCSI expander, and Luminex's Fire Series software. It is also available in a multiple reader, multiple recorder configuration.

The internal LSX SCSI expander enables the entire library to require only a single SCSI ID on the server. The Luminex Fire Series software is high performance CD-ROM/CD R networking software that supports CD-ROM information retrieval and multiple/simultaneous CD R recording sessions on virtually every network environment.

The 4-reader library solution is priced at \$12,995, and the recordable version starts at \$16,995.

Contact Luminex, phone: (800) LUMINEX, fax: (909) 781-4105, e-mail: info@luminex.com, <http://www.luminex.com>.

Systems Management

NetTech, Inc. announced EView/SMS, which increases the management capabilities of Microsoft Systems Management Server (SMS) by integrating it into leading SNMP management platforms such as HP OpenView.

NetTech's EView/SMS software utility integrates the management of Microsoft SMS sites into HP's OpenView Network Node Manager. EView/SMS delivers expanded scalability and

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centralized control while providing a complete view of all SMS sites and associated resources via OpenView Network Node manager's GUI. EView/SMS gathers information from SMS sites about installed software, disk usage, CPU utilization, memory usage, and vital system management data necessary to establish a proactive network environment. The SQL query feature enables users to search SQL database attributes to perform ad hoc queries and reports.

Contact NetTech, phone: (919) 872-1900, fax: (919) 872-1930, <http://www.nettech.com>.

Business Intelligence Solution

CrossZ Software has announced QueryObject System on HP-UX. With

QueryObject System on HP servers, organizations can now easily create dozens of data marts in a single day and distribute them to business managers enterprise-wide—using desktops, laptops, and the existing IT infrastructure.

QueryObject System includes QueryObject DBA, which allows organizations to extract raw data from various sources (OLTP, legacy, and other relational databases) for business intelligence applications; QueryObject Ready File, a fully-updatable business intelligence repository designed for the high-speed creation of data marts; QueryObject Designer, for selecting the data and defining data mart scheme in response to user application needs; QueryObjects, which deliver all the data a user needs;

QueryObject Open, which enables QueryObjects to serve as a universal data mart; and QueryObject KeyBack, which maintains persistent hard-key links with source data.

Contact CrossZ Software, phone: (800) 522-6302 or (516) 228-8500, fax: (516) 228-8584, <http://www.crossz.com>.

Advanced OpenView Map Building

Onion Peel Software LLC (OPS), has announced new advanced map building and administration capabilities for HP OpenView. Named Amerigo, the product enables network maps and devices to be built and controlled automatically, virtually eliminating manual customization of maps, submaps, symbols, and container objects.

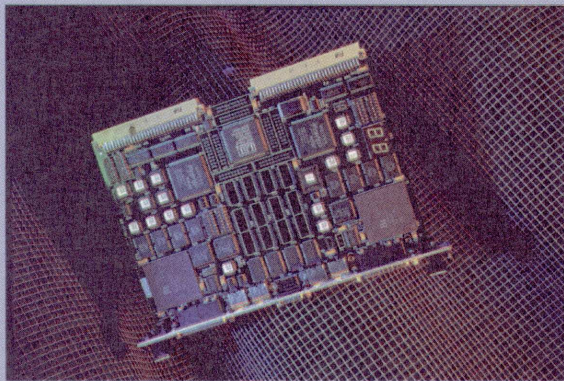
Configured via a simple branching tree GUI, maps can be built and customized in significantly less time. Amerigo watches the network and dynamically moves devices to the proper place in the map based upon "Amerigo Rules." Devices can be grouped together by physical location, IP address, device type, device class, or any other object attribute. Amerigo can control a single map, multiple maps, or even maps on different OpenView computers.

Amerigo is supported on HP-UX 10.10, Solaris 2.5, OpenView 4.1, and Network Node Manager 4.1.

Contact Onion Peel Software, phone: (919) 571-7910, fax: (919) 571-8338, e-mail: sales@ops.com, <http://www.ops.com>.

Universal Database Access

UniPrise Systems, Inc. has acquired Access/DAL middleware tools from BEA Systems, Inc. Access/DAL enables SQL-based applications running on Windows and/or Macintosh clients to access any



Space Electronics MAXIM

Graphics Accelerator

Space Electronics, Inc. (SEI) has announced an enhanced version of its newly acquired Megatek Corporation's MAXIM 6U VME board. It is a complete X-Window System based graphics solution for VME computers. When integrated with UNIX or real-time operating systems, MAXIM offers VME graph-

ics performance for display-intensive applications such as C⁴I, GIS, process control, imaging, animation, CAD, simulation, and scientific visualization.

The new MAXIM Graphics Accelerator provides a 20 percent improved graphics acceleration performance while retaining full functionality, according to the company. This VME board features two independent graphics channels on a single 6U VME card.

Pricing for the MAXIM Graphics Accelerator ranges from \$3,260 to \$5,240, depending on single or dual channel configuration and memory options.

Contact SEI, phone: (619) 452-4167, fax: (619) 452-5499, <http://www.newspace.com/spaceelec>.

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of 11 different relational databases on 10 different server platforms. Version 2 adds client support for 32-bit platforms as well as server support for Windows NT running SQL/Server, Informix, Oracle, and Sybase databases.

New capabilities include support for binary large objects, including graphic images, video, sound, and tabular data; data encryption; a data compression (50:1) algorithm; support for any size records; SQL caching that accelerates performance up to 400 percent over non-cached requests; and outer database joins from two or more tables within a database connected to the DAE server.

UniPrise's ISQL is also compliant with ODBC level 2 specifications and offers a choice of ODBC or native connectivity.

Contact UniPrise, phone: (714) 864-2000, fax: (714) 864-2001, <http://www.uniprise.com>.

Agent-Enhanced ORB for Java

ObjectSpace, Inc. has announced Voyager, said to be the world's first agent-enhanced object request broker (ORB) for Java. Voyager is 100% pure Java and was designed to be used for systems development on general purpose platforms as well as in embedded applications.

The production version of Voyager will be available in the third quarter of 1997. As with the beta version, the production Voyager platform will be free for most commercial uses. Source code licenses are also available under favorable terms. Packaged as a core product, this release will include online HTML documentation and comprehensive examples. In the future, ObjectSpace will offer significant add-on capabilities, a complete suite of support services, and a comprehensive developer support program.

Contact ObjectSpace, phone:

(972) 934-2496, fax: (972) 663-9099, <http://www.objectspace.com>.

Web Application Development

ParcPlace-Digitalk, Inc. has announced VisualWave Server 2.1, an Internet application server that incorporates support for JavaScript and VRML, Java rendering, framesets, and client pull. Version 2.1 supports Smalltalk-style dialogues, standard Web cookies for storing user session information, Web layout and HTML editor improvements that address specific customer requests, and a number of examples for helping developers get started on client creation.

VisualWave applications automatically maintain session information for each user as they navigate throughout the Web application, so the need to program and maintain CGI programs or Perl scripts is eliminated.

Oracle support and browser and Web

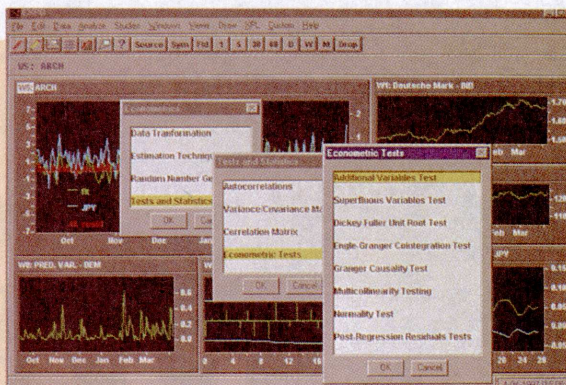
LMT EXPO**Internet Market Data Analysis**

Leading Market Technologies has announced EXPO/Web. Incorporating LMT's new Co-Browser technology, EXPO/Web provides users of the EXPO analytics and decision-support platform with direct access to Internet/intranet-based market data sources through a seamless, transparent connection via Netscape Navigator.

Users enter into EXPO the Web address of the data they want. EXPO/Web's Co-Browser transparently accesses the data, interprets its layout, and makes it available for use with all of EXPO's analytics and decision support tools.

EXPO provides open access to all major market data sources. It is available as a standard feature of LMT's EXPO, EXPO/ATA, and BasketTrader products on UNIX and Windows platforms. EXPO is priced at \$2,995 for Windows and \$3,995 for UNIX.

Contact Leading Market Technologies, phone: (617) 494-4747, fax: (617) 494-4788, <http://www.lmt-expo.com>.



server independence are also featured.

Pricing for the Windows NT version is \$4,995. Pricing for the HP-UX or Sun Solaris version is \$9,995. Upgrade pricing is available.

Contact ParcPlace, phone: (800) 759-7272 or (408) 481-9090, fax: (408) 481-9095, <http://www.parcplace.com>.

New from Axiom**Traffic Management System**

Axiom Inc. has introduced Release 4.1 of the Manifest Traffic Management system (formerly called AUTRAX). With the new release, users can access reports via standard Web browsers.

Release 4.1 features of the Manifest Host include support for color workstations and X terminals, disk mirroring, X Windows and OSF/Motif GUI standards, X.25, 64 Kbps, TCP/IP communications, and CD-ROM for Hewlett-Packard doc-

umentation. The Manifest Application supports GUI application software, ODBC file transfer, Informix 7.2, HP-UX 10.2, ITU E.500 busy hour measurements, online graphing, multiple windows, and native language support.

The system supports dial-up, dedicated, and private networks. Users can create line, bar, and pie charts from the collected traffic data. Graphs can be generated using data files created with any text file program (i.e., vi, sed, awk, etc.) and then stored or displayed on an X terminal or printed to a laser printer.

Real-Time Billing System

Axiom Inc. has announced Release 6.1 of the Sterling 500 Host Collector real-time billing data collection and processing system. Release 6.1 features the HP 9000 K410 multiprocessor computer, an upgrade that allows the Sterling 5000 to handle larger data volumes more

quickly. The K410 multiprocessor computer allows for up to four processors, so users can select the power they need.

The new release of the Sterling 5000 features up to 20 GB of RAID storage for each volume group and incorporates RAID alarms. The system's tertiary storage (implemented in the system's GUI) features better flexibility and enhanced input audit reports.

The Sterling 5000 Host Collector is part of Axiom's Sterling Solution, a fully integrated line of systems that supplies real-time data for billing, fraud management, customer care, and marketing.

Contact Axiom, phone: (609) 866-1000, fax: (609) 866-0185, <http://www.telesciences.com>.

Web Server

C2Net Software has announced that its Stronghold secure Web server now supports the nFast hardware cryptographic accelerator from nCipher Corporation Ltd. nCipher's nFast cryptographic accelerators speed up the processing of crypto keys. Using nFast together with the Stronghold Web server gives customers throughout the world a scalable environment for conducting secure business on the Internet.

nCipher's nFast cryptographic accelerator interfaces via a standard SCSI2 interface and mounts within the space of a standard 3.5-inch disk drive bay. Each nFast accelerator can carry out approximately three hundred 1,024-bit public key signings per second.

The Stronghold Web Server is an enhanced, secure, commercial version of the popular Apache server. Based on figures in a Netcraft survey (<http://www.netcraft.com/survey>), Stronghold is the second most popular commercial server for UNIX and for secure applications on the Internet.

Contact C2Net Software, Inc., phone: (510) 986-8770, fax: (510) 986-8777, <http://www.c2.net>.

New from Butterworth-Heinemann Publishing

SQL 6.5 Optimization Guide

Butterworth-Heinemann partner Digital Press has announced *The SQL Server 6.5 Performance Optimization and Tuning Handbook*, by Ken England.

The handbook addresses the factors that influence database performance, beginning with good physical design. It then covers internal storage structures to aid in performance tuning. The critical subject of indexes is then discussed, followed by the query optimizer.

SQL Server is highly integrated with Windows NT, so it is crucial that it and Windows NT are both optimized to work together. The book covers this integration, as well as how to detect CPU, memory, and disk bottleneck. Locking is discussed in detail with many example scenarios. A chapter is devoted to the performance monitoring tools available with SQL Server. Finally, a performance, tuning, and optimization checklist is provided.

The SQL Server 6.5 Performance Optimization and Tuning Handbook, by Ken England (ISBN: 1-55558-180-3), is priced at \$34.95.

Help Desk Management

Butterworth-Heinemann has announced *How to Manage the I.T. Help Desk*, by Noel Bruton. This book packs years of user support experience into one volume. The "how to" book offers tools for measuring productivity and features ten key steps for successful support, while user support successes and

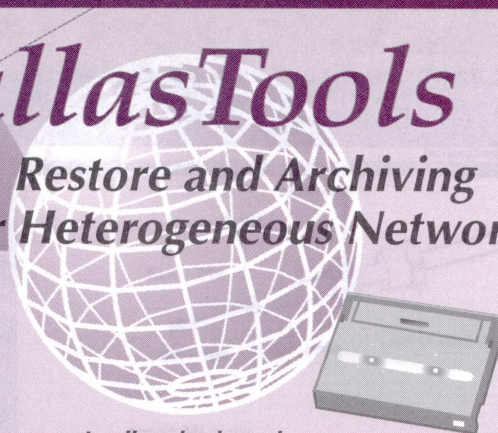
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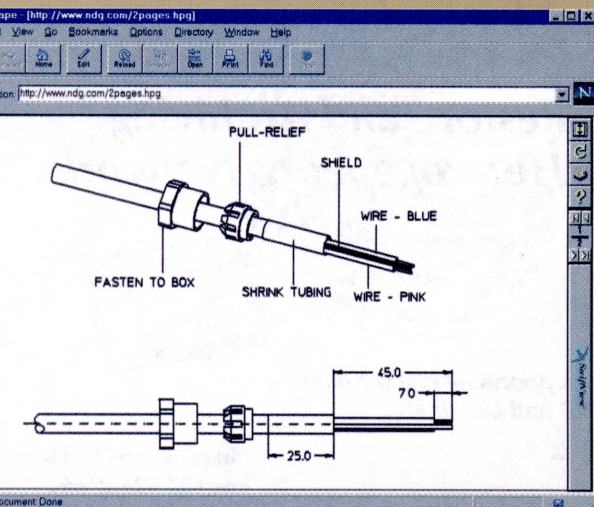
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Web-Based Document and Drawing Editor

Northern Development Group, Inc. has announced SwiftView Plug-in for Netscape and Microsoft Web browsers. The SwiftView Plug-in enables fast,

Northern Development Group SwiftView



plotters, thus reducing costly and time-consuming "document authoring."

The SwiftView Plug-in is free to download. Users purchase an encrypted license file from NDG for \$1,500, place it on the Web site, and an unlimited number of plug-in users have immediate, interactive access to real documents and drawings. The SwiftView Plug-in supports both Netscape Navigator/Communicator 3+ and Microsoft Internet Explorer 3+ on Microsoft Windows 95 or Windows NT.

Contact NDG, phone: (503) 620-0196, fax: (503) 639-8466, e-mail: sales@ndg.com, <http://www.ndg.com>.

interactive viewing and printing of PCL, HPGL, and TIFF documents and drawings. Using the data sent to industry-standard Hewlett-Packard printers and plotters ensures that all formatting is preserved, including page numbers.

SwiftView interactively displays what would have been printed on Hewlett-Packard printers and

Timestamp, which can store and retrieve the occurrence of real-time system events down to a millionth of a second.

Users can easily convert to using the Microsecond Timestamp and specify the MSDATELIMIT variable, but Empress also provides application modification consulting and training. The maintenance program provides customers with regular software upgrades.

Contact Empress, phone: (301) 220-1919, e-mail: sales@empress.com, <http://www.empress.com>.

Ultra-SCSI Solid-State Disk

Imperial Technology has announced the MegaRam-4000, said to be the industry's first Ultra-SCSI solid-state disk system. The MegaRam-4000 features an internal 100 MB/sec bandwidth to service up to six independent Ultra-SCSI ports, each capable of transferring data at up to 40 MB per second. The six Ultra-SCSI ports can be connected to multiple hosts or to different ports of the same host. The platform-independent MegaRam-4000 can be configured with storage capacities from 268 MB to more than 4 GB. It is compatible with earlier SCSI interface protocols.

The MegaRam-4000 is configured with redundant AC inputs, power supplies, and batteries, as well as a multiple-byte error correction capability to protect the integrity of the stored data. An internal UPS and disk backup ensure that data is not lost in the event of a power interruption.

The MegaRam-4000 is available in both a tabletop enclosure or a 19-inch rackmount configuration and is priced from \$25,000.

Contact Imperial Technology, phone: (800) 451-0666 or (310) 536-0018,

failures are revealed in case studies.

This book gives readers techniques for justifying staff and other expenditures; gaining senior management support; getting the users on your side; running a motivated and productive team; and designing and managing services and service levels. It can help readers design and launch helpdesk and support services, measure their success, and ensure user satisfaction.

How to Manage the I.T. Help Desk, by Noel Bruton (ISBN: 0-7506-3811-7), is priced at \$24.95.

Contact Butterworth-Heinemann, phone: (617) 928-2623, fax: (617) 928-2620.

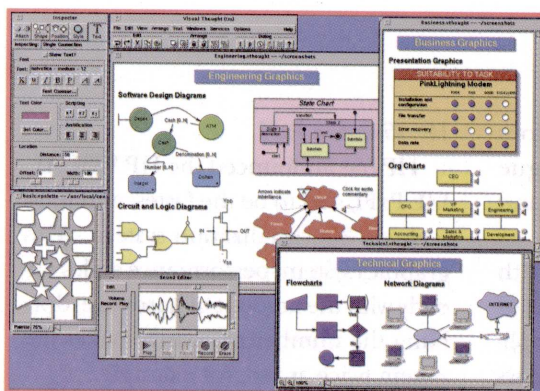
Year 2000 Compliant RDBMS

Empress has announced Empress Version 6.10, the newest version of the development RDBMS for scientific and engineering organizations using UNIX, Windows, or real-time environments. Version 6.10 enables users to input time and date data beyond the year 2000. A user can enter the year with either two digits or all four, and the Empress RDBMS will internally store this data as four digits. This four-digit universal date format maintains accuracy in performing calculations, comparisons, and conversions involving dates.

Additionally, for time data, Empress Version 6.10 features a new Microsecond

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fax: (310) 536-0124, <http://www.imperialtech.com>.

Fault-Tolerant Electronic Commerce

St. Paul Software has entered into an agreement with Stratus Computer, Inc. to offer its electronic commerce products on Stratus fault-tolerant computers. St. Paul Software will offer its spEDI*suite electronic commerce package, consisting of translation, mapping, and scheduling tools, on the Stratus systems. The company's software is available on Stratus Continuum Series systems, with a choice of Stratus FTX, a fault-tolerant UNIX System V Release 4 operating system, or the HP-UX operating environment.

The combination of St. Paul Software's EC/EDI software and Stratus' hardware provides an excellent solution for those businesses that recognize electronic commerce as a mission-critical application and rely on the Stratus platform for its fault-tolerant capabilities.

Contact St. Paul Software, phone: (612) 603-4400, fax: (612) 603-4403, e-mail: info@stpaulsoftware.com, <http://www.stpaulsoftware.com>.

New From HP

Windows/HP-UX Application Co-development

Hewlett-Packard has introduced SoftBench OpenStudio, which enables developers to write Microsoft Visual C++ applications for Windows-based clients and HP-UX servers in a single development environment. With OpenStudio users can perform simultaneous debugging sessions for HP-UX and Windows in two side-by-side views; create single-source-stream applications; and develop

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or maintain existing HP-UX applications from a PC. C++ libraries from Rogue Wave Software, Bristol Technology, and ILOG support OpenStudio.

The OpenStudio client works with Visual C++ Version 5.0, which is part of Visual Studio (Microsoft's 32-bit application development tool for Windows 95 and Windows NT). The server includes the HP-UX C and C++ compilers and the runtime system of HP's implementation of CORBA.

Single and bundle pricing for client and server OpenStudio licenses are available starting at \$999.

OpenView-Ready Program

Hewlett-Packard has announced the HP OpenView-Ready Program, which enables vendors of Windows NT and UNIX systems to deliver preconfigured versions of the HP OpenView management solution packaged with their systems.

Each vendor participating in the program will be able to provide a tailored version of OpenView that combines vendor-specific management functionality with OpenView's capabilities. End users will be able to move easily from managing a single server to managing a workgroup or an enterprise environment while maintaining the preconfigured management knowledge and policies and the OpenView look and feel. End users also will be able to link more effectively the management of their servers and workgroups to their enterprise-management solution.

HP plans to ship a tailored version of its OpenView solution at no additional cost with its HP 9000 Series HP-UX servers. This new packaged system will give HP 9000 and NetServer users preconfigured, out-of-the-box systems management.

HP Visualize PxFl

HP has announced the HP VISUALIZE PxFl, said to be the fastest and most scalable 3D visualization system. With graphics system, performance scales linearly with the amount of hardware; doubling the number of boards makes the system twice as fast, for example.

The system, based on PixelFlow technology developed at the University of North Carolina at Chapel Hill, N.C., provides 3D graphics performance and photo-realism, enabling users to visualize their largest and most complex datasets interactively to replace physical prototypes with highly realistic virtual models. Operations that typically need to run overnight can be viewed in real time.

HP VISUALIZE PxFl supports the OpenGL application programming interface for porting existing high-performance 3D graphics applications and for new software development. HP VISUALIZE PxFl graphics functionality also extends the current OpenGL specification by delivering several new rasterizers, interpolators, and shaders. It also supports HP's recently introduced DirectModel toolkit for large-model rendering.

HP VISUALIZE PxFl is orderable now, for delivery in the first quarter of 1998. Pricing ranges from \$100,000 to more than \$2 million.

Unicenter TNG Agreement

Hewlett-Packard and Computer Associates International, Inc. recently announced that HP will bundle CA's Unicenter TNG Framework with all HP-UX servers and workstations.

HP will resell Unicenter TNG, the end-to-end enterprise-management solution built on the Unicenter TNG Framework, and will provide services through its Professional Services Organization and

support for the Framework through its Response Center Organization.

The Unicenter TNG Framework on HP-UX servers and workstations enables organizations to view and manage their entire information-technology environments end-to-end—from the mainframe to the Internet.

The Unicenter TNG Framework includes services for event management; discovery services; scheduling; manager/agent; and 2D, 3D, and Web GUIs, along with a standards-compliant object repository for integration of application messages and events from many different management products. Unicenter TNG's 3D real-world interface can be employed using a Java-based front end. Additionally, HP systems-administration tools for HP-UX and NetServer systems have been integrated with the Unicenter TNG Framework.

HP will deliver the Unicenter TNG Framework as a part of the HP-UX operating system to its new and existing customers at no additional charge.

Check Point/HP Agreement

Check Point Software Technologies Ltd. has been selected as a key technology supplier in HP's Praesidium Enterprise Security Framework for Internet and intranet computing. Under the terms of the agreement, HP will place the Check Point FireWall-1 enterprise security suite on its price list, enabling HP customers and authorized resellers to purchase FireWall-1 directly through HP.

HP will sell FireWall-1 for HP-UX and Microsoft Windows NT, with both products expected to be available to customers after August 1. HP's Professional Services Organization and Software & Services Group also will provide world-

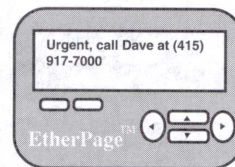
wide consulting, service, and support for the Check Point FireWall product line.

HP's Praesidium Enterprise Security Framework combines HP and best-in-class third-party products and services to build complete end-to-end security solutions. The HP Praesidium Security Solutions, each of which combines specific Praesidium products such as Check Point FireWall-1, are the building blocks of a robust, customized security solution. ■

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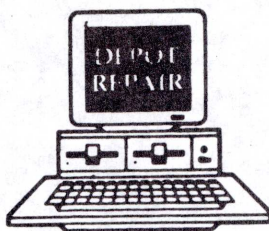
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Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA, or e-mail: pollace@interex.org.

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	64	1033.6	1668.3	161%
75% Read	16	592.87	942.97	159%
	32	687.33	1268.4	184%
	64	745.8	1583.17	212%
50% Read	16	524.5	844.47	161%
	32	559.37	1219.9	218%
	64	594.77	1531.33	257%

Client/Server Labs (CSL) is an independent testing laboratory that provides industry standard benchmarking facilities for feasibility testing for applications and systems. CSL has provided the industry with standard multi-workload benchmarks to measure real data throughput in an actual production environment where multiple workloads execute on a system simultaneously. RPerMark, RPerDBms and the new APPerMark are examples of the multi-workload benchmarks developed by CSL to provide true performance analysis and feasibility testing. These and other benchmark discussions can be found on the CSL Web page at www.csllinc.com

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hp-ux/resource directory

The *hp-ux/resource directory* is a complete resource guide for HP-UX users seeking answers. This is one of the industry's most extensive reference guides for HP-UX products, services, and vendors. It will be devoted entirely to HP 9000 users operating in multi-user, workstation, and multi-system UNIX environments. This bi-annual directory, published each year in March and September, is a separate publication mailed out with *hp-ux/usr* magazine, the only HP-specific publication on the market.

Added BONUS: your message will reach your customers for one full year on the *Internet*. Look for the directory on the Interex home page <http://www.interex.org>. The investment for a full year listing in the *hp-ux/resource directory* is \$475.

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Accounting/Financial	Fax Software	Pointing Devices
Accounting Software	File Manager Utility	Personnel Services
Alphanumeric Paging Software	Financial	Power Protection & Conditioning
Application Development Software	Fourth Generation Language	Printers
Application Development Tools	GIS (Geographic Information System)	Print Management
Application Development Tools/4GL	Government & Utility Software	Print Management Software
Application Engineering	Graphics	Process Control Software
Automated Software Quality	Groupware	Production Planning
Backup Hardware	Hardware	Project Management
Backup/Restore	Hardware/Mass Storage	Protocol Converters/Interfaces-Hardware
Backup Software	Help Desk Management	Publications
Bar Code Data Collection Systems	Hardware Subsystems	Public Safety Software
Batch Job Management	Hierarchical Storage Management	Quality Assurance Tools
Books	Human Resources & Personnel Systems	RAID
Business-Critical Application Development & Deployment	Image Processing	RAID Disk Arrays
Business Software	Image Storage & Retrieval Management	RAID Storage
CD-R	Industrial Terminals	Records Management
CAD Software/Hardware	Instrument Control	Remote Networking
Change Management for Software Development	Integration Tools	Rentals
Change Management Tools	Interface	Report Viewing, Printing, & Distribution
Checkpoint Restart Facility	Internet	Report Writers
Client-Server	Internet Commerce	Sales & Marketing
Client-Server Software	Internet/Intranet	Scheduling
Communications	Internet Services	Scheduling/Task Management
Communications Servers	Internet Solutions	Security
Communications Software	Inventory Control	Service Repairs
Consulting	I/O Boards	Software
Consulting/Systems Integration	Job Scheduling & Workload Management	Software Backup
Customer Support	Justice Software	Software Development Tools
Customer Support/Help Desk Systems	Laser Printing Software	Software Distribution Tools
Database Management Systems	Maintenance	Software Maintenance & Testing
Database Management Tools	Manufacturing Software	Spoolers
Data Center Management	Mass Storage	Spreadsheets
Data Migration Tool	Mass Storage Peripherals	Statistics/Data Analysis
Data Warehousing	Math Library	System Integration
Decision Support Systems	Memory	System Management
Disaster Recovery	Memory Upgrades	System Management Tools
Distributed Computing	Middleware	System Printers
Distribution Software	Migration Services	3-D Graphics Tool Kit
Distributor	Migration Services/Tools	3-D Porting Tool
Document Management	Migration Tools	Tape Backup Products
Editors	Millennium Solutions	Tape Storage/Data Interchange
Electronic Data Interchange (edi)	Multimedia	Technical Documentation/Cross Referencing
Electronic Form Printing	Network Backup Software	Terminal Emulation
E-Mail & Directory Integration	Networking	Text & Information Retrieval
End-User Access Tools	Networking Systems	Time & Billing
End-User Computing	Network Management	Time Reporting Terminals
Equipment	Output Management	Training
Facility Maintenance Software	Payroll	User Groups
Executive Information Systems	PC Card Reader	Video/Keyboard/Mouse Extension
Fault Management	PC Integration	Warehouse & Distribution Management
	Performance	Workstations
	Performance Software	

Other categories may be created as needed.

hp-ux/resource directory

Spring 1998 Listing Form

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<input type="checkbox"/> Company Product Logo or Photo	\$100	\$ 50	\$ _____
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Closing Date: Friday, December 12, 1997

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Category _____ Product Name _____
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Category _____ Product Name _____
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Category _____ Product Name _____
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Category _____ Product Name _____
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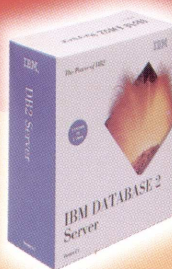
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